Virgina Medical Monthly

Offical Publication of the Medical Society of Virginia

Vol. 60. No. 6. WHOLE No. 975. RICHMOND, VA., SEPTEMBER, 1933 $2.00 A YEAR 25 CENTS A COPY

THE PHARMACOLOGY OF DIGITALIS.*

HARVEY B. HAAG, M. D., Richmond, Va.

Nearly four hundred years ago, the plant we now know as digitalis purpurea was so named by Fuchsius. For over two centuries it led a severely tranquil existence, being only at times called upon to serve as an emetic and expectorant and externally as a dressing to wounds. Towards the latter part of the 18th century, William Withering, of Birmingham, England, detected it as the therapeutic agent in a formula, kept secret by its feminine exploiter, which was gaining an unusual popularity as a remedy for dropsy. After ten years of clinical observation, Withering, in 1785, published his great book, "An Account of the Foxglove and Some of Its Medical Uses: Practical Remarks Upon Dropsy and Other Diseases." Since then digitalis has known no rest; the mass of literature built up around this one drug is astounding; and yet, in spite of the ceaseless endeavors of numerous clinical and laboratory experimenters throughout the world, there remain unanswered a great many questions pertaining to its chemistry and pharmacology.

Of the several species of digitalis, digitalis purpurea, probably because of its greater prevalence, has come into most prominent use; though at the present time digitalis lanata, which is more potent than the purpurea, is receiving the attention of European investigators.

Much and continued dispute has raged over the nature of the active principles of digitalis; but at the present time this mooted question has been somewhat clarified by recent studies, chiefly from abroad, in which the activity of digitalis is described as being due to three crystalline, water insoluble glucosides, namely: digitoxin, bigitalin, and gitalin. These compose about 1 per cent, by weight, of the dry leaf, and are present in about equal amount. The glucosides all have the common property of hydrolyzing under the influence of acids and ferments to yield a common sugar and a "genin." This genin gives the glucoside its characteristic action; but uncombined it is much less active and much less persistent than the whole glucoside. Chemically the three principles are similar, consisting of heavy molecules containing unsaturated lactone chains. Digitoxin, the most certain and first isolated of these compounds, has a formula $C_{41}H_{64}O_{13}$. Physiologically digitoxin is characterized by its higher toxicity, its more rapid absorption, and delayed elimination as compared to gitalin and bigitalin, and it probably gives to digitalis most of its so-called "cumulative" effect. Again, digitoxin is the most stable of the three. It is interesting to note that although the pure principles are but poorly soluble in water, they can be extracted from the leaves by cold water infusion.

In addition to these essential agents, digitalis contains compounds which are common to most plants. The saponin, known as digitonin, has claimed the attention of several investigators, the earlier ones attributing the nausea and vomiting of digitalis to the gastrointestinal irritation supposedly produced largely by this agent; others later believed that it rendered the pure principles soluble in water, and now the opinion is voiced that it increases the cumulative effect of the pure principles but diminshes their absorption from the gastrointestinal tract. In the final analysis we shall probably find that this somewhat maligned saponin plays little if any important part in either the chemistry or pharmacology of digitalis.

Rational therapeutics demand that the potency of a particular medicament be known. In the case of most vegetable drugs this is a relatively simple requirement; for instance, opium can readily be standardized for its morphine content by certain definite chemical manipulations. Unfortunately, the standardization of digitalis is not so simple. Even if the principles above mentioned are those which are responsible for the therapeutic activity of

*From the Department of Pharmacology, Medical College of Virginia, Richmond, Va.

Read at the sixty-third annual meeting of the Medical Society of Virginia in Richmond, November 1-3, 1932.

XUM

digitalis, the great difficulty of extraction alone would militate against this type of chemical assay. Equally as disturbing is the fact that different specimens of digitalis yield different amounts of these glucosides; thus adequate chemical standardization could be evolved only after it had been determined what proportions of each of these should exist in a leaf therapeutically satisfactory. The various color reactions for assaying digitalis are practically worthless. This unhappy condition early led to the use of animals in assaying digitalis, frogs being used first about the middle of the 19th century. Since then, numerous species of animals, including even man, have been proposed as subjects for digitalis standardization. At the present time the two most popular methods are: first, the one hour frog method perfected by Houghton, and now the official pharmocopoeial method, and, second, the intravenous cat method of Hatcher and Brody. An active tincture will cause systolic stoppage of the frog heart one hour after the injection into the lymph sac of 0.006 c.c. per gram frog weight. Judged by the cat method the same preparation would cause the death of an etherized cat in about ninety minutes during which time about one c.c. of the tincture per kg. cat weight had been injected intravenously. This latter figure for cats is termed a "cat unit," and it follows that the smaller its numerical value the more potent the preparation. Besides the fact that in one of these tests a cold blooded animal is used and in the other a warm blooded, there is the further essential difference that in the frog method the question of absorption plays a part, whereas this is not true for the cat procedure in which the drug is injected directly into the circulation. Hence, it is conceivable that a preparation, because of poor absorbability, may have a low value when assayed by the frog method, and yet be quite active when tested upon cats. The criticism that these tests, because they measure toxicity rather than therapeutic effectiveness, do not properly evaluate digitalis, hardly need be discussed in view of the successful application, particularly of the cat method, to clinical therapeutics by so many prominent cardiologists.

The question as to the stability of digitalis and its preparations has provoked an unusual amount of investigation. Let it be said at once that the dry powdered leaf appears to be the most stable, and therefore the most reliable. Specimens of leaves have been shown to be of standard strength after more than forty years. Tinctures vary in their rate of deterioration, but as a rule lose their potency rather slowly. Some tinctures have been reported as being only about one-half their original strength after six months, but again it has been established that others have retained their original activity after five years. The most recent work upon a series of tinctures showed no loss after one year, a loss of about 12 per cent after the second year and after eleven years about 20 per cent loss in potency. Attempts at stabilizing the tincture have not been particularly fruitful. Now that more is known concerning digitalis chemistry, this can be more fully appreciated. As the digitalis preparations are rendered more refined they apparently become more stable, and, like ordinary tinctures, increase in stability as the alcoholic content is increased. The aqueous preparations are the most unstable; however, the old view that the infusion loses its strength overnight is no longer tenable. Certainly under ordinary clinical conditions it retains its full activity for at least a week. When kept in a refrigerator or in well filled. sealed, sterile containers it loses its potency very slowly.

It might be mentioned here that a study by the cat method of the potency of twelve samples of tincture of digitalis purchased in different sections of Virginia several years ago, gave values ranging from 25 per cent above to 60 per cent below the average accepted figures. That this is not a local condition is evidenced by results obtained by other similar studies both in this country and abroad.

Observations as to the activity of the various proprietary preparations have in the past shown that these too display differences in potency when tested by any one method. However, it should be borne in mind that this is not necessarily due to any dereliction on the part of the manufacturers but rather is probably the result of failure to agree upon any one definite standard. There is little reason to believe that these products are more stable than the average official tincture, or that they are therapeutically superior.

That digitalis, either in the form of the tincture or the powdered leaf, is absorbed from the gastro-intestinal tract with more ease than is ordinarily thought, is shown by the fact that definite effects upon the heart can clinically be detected in about two hours after the oral administration of a suitable amount.

Rarely a preparation is encountered which is active by assay, but because of poor absorbability is therapeutically deficient. The rectal administration of digitalis is apparently on the increase, its advocates claiming that it can be given to patients who are nauseated and prone to vomiting, and as it is absorbed from the rectum by the inferior hemorrhoidal veins its avoids passage through the liver which might destroy some of the principles. The rate of absorption of digitalis from the rectum is about the same as that following its oral administration.

After absorption a higher concentration of the active principles is found in the heart muscle than in any other tissue, the liver containing one-fourth and the kidney one-half the percentage present in the heart. The glucosides, particularly digitoxin, form stable compounds with the cardiac tissue, while the genins are more easily washed from the heart muscle. The action of digitoxin persists for many days; while the effects of gitalin and bigitalin are fleeting.

The direct action of digitalis upon the heart is to increase the tone, the contractility, the irritability, the refractory period, and the conduction time. By a direct action it also apparently increases the metabolism of the heart. By a reflex action arising from the heart or other viscera, the vagus is stimulated with resulting slowing in rhythm and again inhibition of conduction. In the disease in which digitalis therapy is most encouraging, namely, auricular fibrillation, the impairment of conduction and the increase in ventricular tone contribute largely to the clinical improvement. Peculiarly enough it has lately been shown that the drug itself is capable of producing auricular fibrillation in toxic amounts. It is important to remember that studies upon normal men and animals indicate that digitalis can actually diminish cardiac output, at times astoundingly. This has been explained as resulting from the increase in cardiac tone, and, possibly, pooling of blood in the hepatic circulation. Again, mention should be made of animal experiments which demonstrate that digitalis is capable of causing constriction of the coronary vessels, a laboratory finding which has been borne out by clinical observations that patients occasionally suffer anginoid pains during digitalis therapy. Along similar lines experimental trials have led to the conclusion that the heart in coronary obstruction is no more sensitive to digitalis than is the normal organ. It has occurred with laboratory animals that apparent recovery has followed the administration of large doses of digitalis, only to give way several days later to death. Somewhat similar delayed deaths have been observed clinically and it would appear that this question deserves further study.

The power of digitalis to increase the white cell count has been recorded, as well as its ability to stimulate pancreatic secretion.

While it is generally believed that among the first demonstrable effects of digitalis on the heart is a beginning inversion of the T-wave, this has recently been doubted as a result of observations both upon humans and animals. Indeed, the ability of the drug to even produce any appreciable T-wave change has been questioned. Within the past several months lengthening of the Q-S interval has been stated to be among the first of the electrocardiographic changes.

As is well known, one of the earliest clinical signs of digitalis intoxication is nausea and vomiting. This is said to result from reflex stimulation of the emetic center the stimulus arising from the heart or other organs. Certainly the power of digitalis to cause nausea and vomiting is intimately related to its therapeutic effectiveness. It is an interesting and important phenomenon that this vomiting reflex may become depressed after repeated doses of digitalis, thus making it possible for a patient to become severely poisoned with the drug without at the same time manifesting emesis.

The diuresis that digitalis so frequently produces is usually explained as the result of the increase in the blood flow through the kidney, brought about by the improved cardiac activity. Nevertheless, there is evidence which indicates that the drug might have also a more direct diuretic effect upon the renal tissue.

There has been some controversy concerning the use of digitalis in diphtheria. The more recent writings, based upon animal experimentation, conclude that digitalized animals tolerate diphtheria toxin much better than do untreated controls.

In closing, it might be well to cite, as an example of the difficulties besetting the pharmacological explanation of the digitalis effects, a paper by Weiss and Ellis in which they state that in four patients with rheumatic heart disease associated with reduced functional capacity, digitalis produced clinical improve-

XUM

ment, although there was no increase in cardiac output, no change in velocity of blood flow or circulating volume and no significant change in vital capacity. They suggest that the resulting reduced heart rate after exercise might *per se* constitute an improvement so far as economy of the heart is concerned. The effect of digitalis on nervous structures in maintaining important cardio-vasomotor reflexes may have a considerable significance.

BIBLIOGRAPHY

1. Bliss, A. Richard: An Experimental Investigation of the Pharmacologic Activity of Drug Store Samples of Infusion of Digitalis U. S. P. IX, *J. Lab. Clin. Med.*, 7:225, 1921.
2. Behrens, B.: Gross, O., and Hildebrandt, F.: Die Auswertung von Digitalispräparaten. *Mün. med. Wochschr.*, 78:2067, 1931.
3. Brams, W. A., and Gableman, P.: The Effect of Digitalis on the T-Wave of the Electrocardiogram—An Experimental Study in Human Beings. *Am. Heart J.*, 6:804, 1930-1931.
4. Cheer, S. N.: Effect of Digitalis on Duration of Electrical Systole ("Q-T" Interval), in Cardiac Failure. *Proc. Soc. Exper. Biol. Med.*, 28:256, 1931.
5. Chillingworth, Felix P.: Haskins, Frank E., and Casey, Gertrude U.: Assay of Tincture of Digitalis. *J. Lab. Clin. Med.*, 16:850, 1931.
6. Cloetta, Max: The Biochemical Action of Digitalis. *J. A. M. A.*, 93:1462, 1929.
7. Cohn, Alfred E., and Stewart, Harold J.: The Relation Between Cardiac Size and Cardiac Output per Minute Following the Administration of Digitalis in Normal Dogs. *J. Clin. Invest.*, 6:53, 1929.
8. Costopanagiotis, B C.: Uber die diuretische Wirkung der Digitalis-Glykoside erster und einiger zweiter Ordnung an der isolierten Froschniere. *Arch. f. Exper. Path. u. Pharmakol.*, 167:660, 1932.
9. Cushny, A. R.: The Action and Uses in Medicine of Digitalis and Its Allies. Longmans, Green and Co., 1925.
10. Dock, W., and Tainter, M L.: Influence of Digitalis on the Sensitivity of the Cardiac Vagus Endings. *Proc. Soc. Exper. Biol. Med.*, 29:726, 1932.
11. Eggleston, Cary, and Wyckoff, John: The Absorption of Digitalis in Man. *Arch. Int. Med.*, 30:132, 1922.
12. Esveld, L. W.: Digitalisuntersuchungen. 1. Mitteilung: Die kumulative Wirkung von Digitalis purpurea und lanata. *Arch. f. exper. Path. u. Pharmakol.* 160:375, 1931.
13. Fenn, G. K., and Gilbert, N. C.: Anginal Pain as a Result of Digitalis Administration. *J. A. M. A.*, 98:99, 1932.
14. Freund, Hermann: Digitaliswirkung und Stoffwechsel. *Arch. f. exper. Path. u. Pharmakol.*, 167:73, 1932.
15. Giacomi, E.: Die Beteiligung der einzelnen aktiven Digitaliskorper an der Gesamtwirkung der Droge *Arch. f. exper. Path u. Pharmakol.*, 117:67, 1932.
16. Gold, H.: Digitalis Elimination. *Arch. Int. Med.*, 32:779, 1923.
17. Gold, Harry: Action of Digitalis in the Presence of Coronary Obstruction. *Arch. Int. Med.*, 35:482, 1925.
18. Gold, H.; Kwit, Nathan, and Travell, Janet: The Depression of the Vomiting Mechanism by Digitalis. *Proc. Soc. Exper. Biol. Med.*, 29:66, 1931.
19. Gremels, H.: Uber die diuretische Wirkung von Digitalisglykosiden und verwandten Stoffen. *Arch. f. exper. Path. u. Pharmakol.*, 157:92, 1930.
20. Haag, Harvey B., and Hatcher, Robert A.: The Stability of Digitalis and Its Preparation. *J. A. M. A.*, 93:26, 1929.
21. Haag, H. B., and Jarrett, L. E.: The Variability of Pharmaceutical Preparations. *J. Am. Pharm. Assoc.*, 20:474, 1931.
22. Haskell, Chas. C.; Daniel, D S., and Terry, G. S.: Deterioration of the Tincture of Digitalis. *J. Am. Pharm. Assoc.*, 11:918, 1922.
23. Hatcher, R. A., and Brody, J. G.: The Biological Standardization of Drugs. *Am. J. Pharm.*, 82:360, 1910.
24. Heyden, Willy: Beitrag zur Frage der Digitoxinbindung am Herzmuskel. *Arch. f. exper. Path. u. Pharmakol.*, 164:295, 1932.
25. Heymans, C.: Bouckaert, J. J, and Regniers, Paul: Sur le Mecansime Reflexe de la Bradycardie provoquee par les Digitaliques. *Compt. rend. Soc. Biol.*, 110:572, 1932.
26. Hintzelmann, U., and Joachimoglu, G.: Uber die Halbarkeit wasseriger Digitalisextrakte. *Arch. f. exper. Path. u. Pharmakol.*, 112:56, 1926.
27. Hoekstra, R. A.: IV. Die Kumulation der galensichen Präparate aus Folia Digitalis purpurea und aus Folia Digitalis lanata, im Zusammenhang mit ihren Gehalt an reinem Gylkosiden. *Arch. f. exper. Path. u. Pharmakol.*, 163:25, 1931
28. Hoekstra, R. A: V. Die Funktion der Saponin in den galenischen Praparaten der Digitalis purpurea. *Arch. f. exper. Path. u. Pharmakol.*, 163:46, 1931.
29. Houghton, E. M.: Pharmacologic Assay of Cardiac Tonics. *J A. M. A.*, 31:959, 1898.
30. Jacobs, W. A.: Relationship Between Structure and Biological Action of Cardiac Gludosides. *J. Biol. Chem.*, 74:260, 1927.
31. Joachimoglu, G.: Pharmakologische Auswertung einiger Digitalis-Spezial präparate *Deut. Med. Wochschr.*, 54:1585, 1928.
32. Martin, Louis E.: A Clinical Standardization of Digitalis. *J. Pharmacol. Exper. Therap.*, 31:229, 1927.
33. McEachern, Donald, and Baker, Benjamin M: Auricular Fibrillations: Its Etiology and Production by Digitalis Therapy. *Am. J. Med. Sc.*, 183:35, 1932.
34. Myers, G. N: Digitalis in Toxemia. *Lancet.* 220:1239, 1931.
35. Pardee, Harold E. B.: Rate of Absorption of Digitalis from the Gastro-Intestinal Tract. *J. A. M. A.*, 75:1258, 1920.
36. Nyary, A.: Die Resorption von Digitalispräparaten aus dem Darm *Arch. f. exper. Path. u. Pharmakol.*, 165:432, 1932.
37. Robinson, G. Canby; White, Paul; Eggleston, Cary, and Hatcher, Robert A.: The Therapeutic Use of Digitalis. *J. A. M. A.*, 83:504, 1924.
38. Straub, Walther: Lane Lectures on Pharmacology, Stanford University Press. Vol. III, 1931.
39. Tainter, M. L., and Dock, W: Circulatory Actions of Digitalis and Strophanthus. *Proc. Soc. Exper. Biol. Med.*, 27:273, 1930.
40. Ward, F. W.: The Potency of Tinctures of Digitalis and Strophanthus Purchased at Various

Points on the Canadian Market. *J. Can. M. A.*, 16:408, 1927.

41. Weiss, S, and Ellis, L. B.: Circulatory Measurements in Patients with Rheumatic Heart Disease Before and After the Administration of Digitalis. *J. Clin. Invest.*, 8:435, 1930.

42. Windaus, A.: Uber die Glykoside der Digitalisblatter. *Arch. f. exper. Path. u. Pharmakol.* 135:253, 1928.

Discussion

Dr. D. C. Ashton, *Richmond:* The action of digitalis, with the exception of certain contributions that have been made as the result of investigation with instruments of precision, is not much more thoroughly known now than it was at the time Withering introduced it in 1785. Withering at that time advocated that the drug should be used in dropsy. He did not know anything about cardiac or renal disease but realized that he had a medicine, made from the leaves of the purple foxglove, that was useful in dropsy. He advised that it be given until the pulse was slowed, until the patient became nauseated, or until diuresis was produced. As a matter of fact, that is about all we know today. So far as the amount of digitalis that a patient requires is concerned, we certainly do not know it, in spite of attempts at standardization.

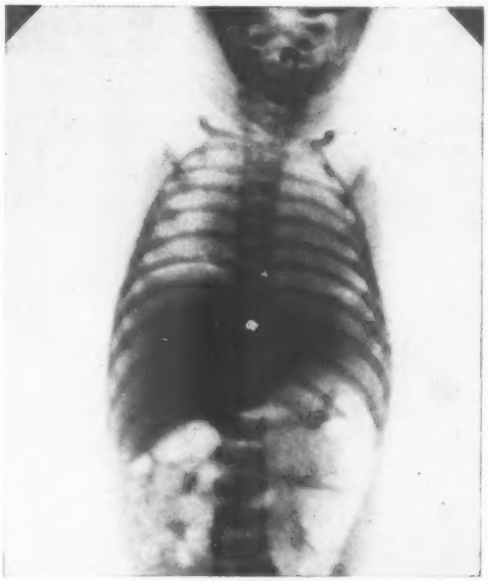
Digitalis is most properly applied in two diseases: Congestive heart failure, in the first place, and auricular fibrillation, in the second place. It is equally valuable in either of the two conditions. It is also valuable in other diseases of the cardiac apparatus. By some it is believed that in elderly patients with diminished cardiac reserve, without any actual failure, or any rhythmic disturbance it may be of some help.

In addition to the various cardiac disorders treated by digitalis, there are a number of other diseases in which it is used, among them the acute infections. There is a good deal of controversy as to whether digitalis is of value in pneumonia. It was thought to be of distinct value, but a number of researches in the last two or three years reveal that digital's may not only be of no value in pneumonia but may do harm. Then its use has been advocated in patients after operation who are suffering from shock and vasomotor collapse. But in those patients who have rapid pulse and low venous pressure I think it is entirely unwise to use digitalis.

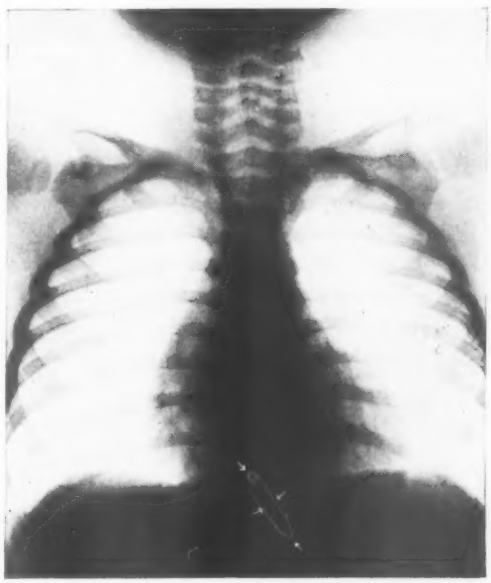
OBSERVATIONS IN THE MANAGEMENT OF ONE HUNDRED FOREIGN BODIES IN THE AIR AND FOOD PASSAGES.*

E. G. GILL, M. D.,
and
JOHN A. PILCHER, Jr., M. D.,
Roanoke, Va.

We present this subject to the medical profession feeling that it is the duty of every bronchoscopist to impress upon those in general practice the indications and limitations of this speciality. It is not our purpose to present anything new in diagnosis or treatment but rather to emphasize again the importance of foreign bodies in the consideration of obscure chest conditions. The number of overlooked foreign bodies and wrong or delayed diagnoses is much too high. When the history is suggestive and with the physical findings, the



Open safety pin in esophagus, point up. Infant 1 month of age.



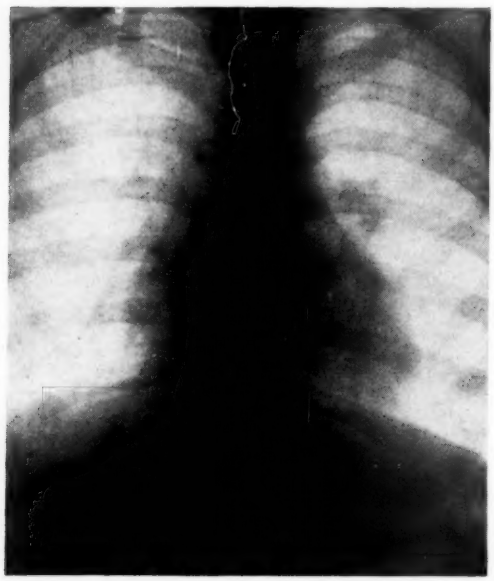
Open safety pin in cardiac end of esophagus, point up. Patient age 3 years.

*Read before the sixty-third annual meeting of the Medical Society of Virginia, in Richmond, November 1-3, 1932.

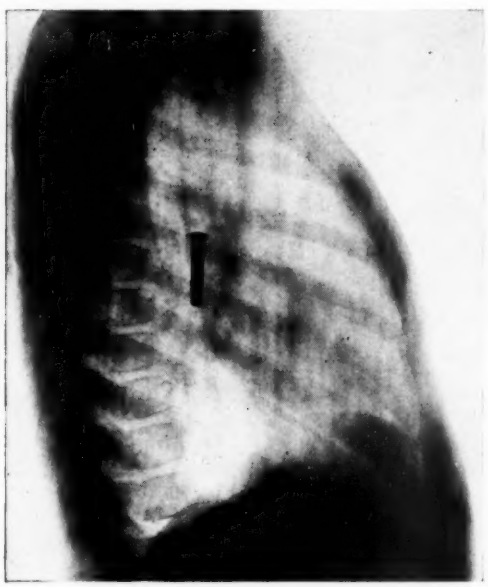
X-ray is all that is necessary to clear up the diagnosis of an apparently obscure case.

In reviewing the records of one hundred cases, we wish to present the following data:

1. The symptomatology of foreign body in the respiratory tract.



Patient age 8 years. French penny in upper esophagus.



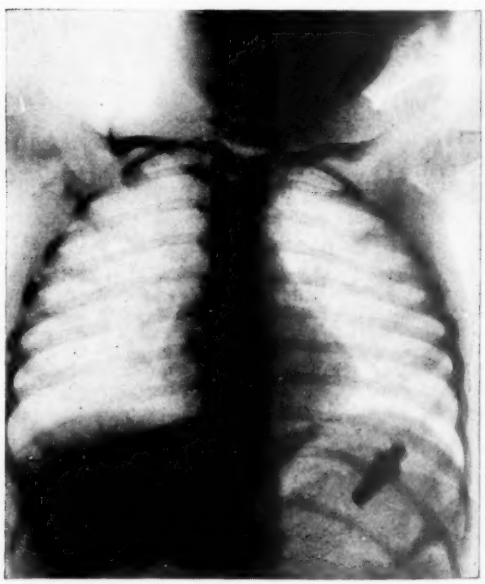
Patient age 6 years. Copper rivet right main bronchus. Duration 24 hours. Bivalve obstruction. Lateral view.

2. Foreign body in esophagus.
3. Location of foreign bodies in respiratory tract.
4. Cause of deaths in this series.
5. Number of tracheotomies.
6. Our methods of preparation of patient for endoscopy:
   a. Preliminary medication.
   b. Anesthesia.

Symptomatology of Foreign Body in Air Passage: A definite history of choking followed by severe coughing with or without cyanosis must always be considered as a foreign body until proven otherwise by every diagnostic procedure at our command. The types of bronchial obstruction are:

1. Bivalve which may only have cough as a symptom; later may have symptoms of lung suppuration.

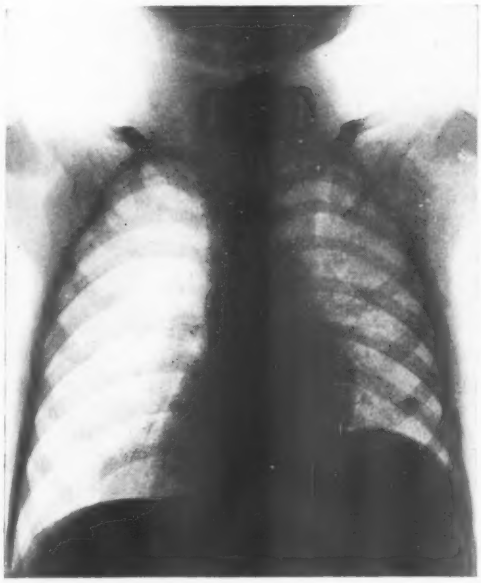
2. *Type* 2. Check valve. Air is trapped in the invaded lung producing greater transparency on the obstructed side with displacement of the heart to the free side and depression and flattening of the dome of the diaphragm on the invaded side.



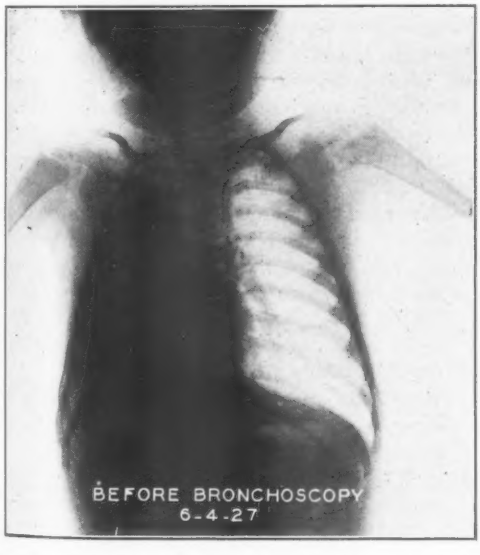
Patient age 3 years. Case of multiple foreign body in food passage. Jack rock in upper esophagus; doll baby in stomach.

3. *Type* 3. *Obstructed atelectasis.* Results in drown lung, later in abscess. This condition is not affected by inspiration or expiration and is clearly shown on X-ray. Physical

signs are characterized by absence of breath sounds and dullness on side of involvement. Heart is displaced towards involved side.



Patient age 3 years. Obstructive emphysema of left lung due to a non-opague foreign body (peanut kernel). Note that the left diaphragm is displaced to opposite side. Prompt recovery following removal of peanut.



Non-radiopague foreign body, pento bean in right main bronchus, causing complete obstruction with atelectasis and drowned lung. Present two days. Note (a) displacement of heart and mediastinum to right or invaded side, (b) depression of left diaphragm, and (c) transparency of un-invaded side.

Radiograph four days following bronchoscopic removal of one-half of the bean. The right main bronchus was uncorked, thereby restoring ventilation and drainage. Note (a) normal position of heart, mediastinum, and diaphragm.

Foreign Body in Esophagus: History of choking and gagging followed by dysphagia is always suggestive of foreign body in the esophagus. Children may have drooling saliva and regurgitation of food. Symptoms referable to the respiratory tract may be caused by a large foreign body pressing on trachea or from overflow of secretions into the larynx. Esophageal foreign bodies have eroded from the esophagus into the trachea.

First Analysis of One Hundred Case Records

Foreign body in Hypo-pharynx	7
Foreign body in Larynx	5
Foreign body in Trachea	4
Foreign body in Right Bronchus	20
Foreign body in Left Bronchus	9
Foreign Body in Esophagus	48
Foreign body in Stomach	7
Total	100

Second Analysis of One Hundred Cases

Deaths due to:	
Lung infection	2
Acute pneumonitis following removal of foreign body	1
Perforation of bronchus	1
Total	4

Third Analysis of One Hundred Cases

Tracheotomies necessary:	
1st. Dyspnea prior to bronchoscopy	7
2nd. Dyspnea following bronchoscopy	2
3rd. For removal of foreign body	2
4th. For aspirating pus in lung abscess	1
Total Tracheotomies	12

XUM

FOURTH ANALYSIS OF ONE HUNDRED CASES

Multiple foreign bodies	1
More than one attempt necessary to remove foreign bodies	4
Failure to remove	3
Number expelled by coughing	3
Number passed into stomach and recovered	7
Youngest patient	1 month
Oldest patient	76 years
Duration foreign body	2 hours to 5 years

FIFTH ANALYSIS OF ONE HUNDRED CASES

Number open safety pins point up in esophagus	3
Number open safety p ns point down in esophagus	1
Number open safety pins point up in larynx	1
Number portions of a safety pin in bronchus	1
Total	6
Number removed endoscopically	3
Number passed by bowel	2
Number coughed from larynx	1
Total	6

SIXTH ANALYSIS OF ONE HUNDRED CASES

Mineral Kingdom:	
Dental plates	2
Mattress tacks	2
Shipping tack	1
Carpet tacks	2
Portion lamp chimney	1
Nails	2
Coin (French penny)	1
Coin (penny)	1
Coin (nickels)	4
Coin (quarters)	2
Piece of wire screen	1
Safety pins (open)	2
Safety pins	4
Portion of safety pin	1
Fibrinous cast	1
Glass beads	3
Jack rocks	2
Intubation tube	2
Straight pin	1
Copper rivet	1
Clip binder (Chicago screw post)	1
Pipe stem	1
Piece of wire	1
Twig of cedar shrub	1
Overall buttons	2
Suit case rivet	1
Metal screw from banjo	1
Vegetable Kingdom:	
Splinter of wood	1
Portion corn cob	1
Coffee grains	2
Peanuts	7
Husk of peanut	1
Grains of corn	6
Beans	2
Watermelon seeds	2
Chestnut	1
Piece of grass seed	1
Nut shell	1
Animal Kingdom:	
Bolus of meat	9
Chicken bones	10
Bolus of food	1
Squirrel bone	1
Beef bone	1
Fish bones	8
Chicken gizzard	1
Vertebra of squirrel	1

Table 3 gives seven tracheotomies prior to bronchoscopy. All of these cases were in a dyspneic condition when admitted to the hospital. Trachoetomy was done for relief of dyspnea and not for removal of foreign body. If the patient's condition permits, we remove the foreign body immediately following the tracheotomy, otherwise we wait until conditions are favorable for bronchoscopy. In only two cases was tracheotomy necessary following bronchoscopic removal of a foreign body in a child. In children under three years of age, laryngeal swelling sufficient to demand a tracheotomy often develops after bronchoscopy, especially in cases of organic foreign body. This complication can be reduced to a large degree by following three definite procedures, namely; relaxation of patient; *do not* use over size bronchoscopic tubes; *do not* prolong the operation. Ten to twenty minutes is enough time for a child under two years of age. Tracheotomy for removal of foreign body was done in two cases. There are certain cases such as large irregular foreign bodies which should be removed through the tracheotomy wound rather than undergo the very certain possibility of stripping it off when attempting to remove it through the swollen and narrowed glottis. This complication may result in sudden death from asphyxiation.

We have abandoned the idea that anesthesia, local or general, is unnecessary in children. Our policy is to give some form of anesthetic in every case that is not dyspneic. In children we obtain muscular relaxation either by use of morphine with atropine (using Young's rule) or sodium amytal per rectum. For adults we use sodium amytal and supplement with ether if necessary, being *mindful never completely to abolish the cough reflex.* We feel confident that better work and less traumatism will occur under muscular relaxation which is impossible without some degree of anesthesia. We have never had a patient to develop pneumonia following bronchoscopy under ether anesthesia. We never had patient develop pneumonia following a tracheotomy.

CONCLUSIONS

A large percentage of all foreign bodies occur in children under five years of age. We have found tracheotomy necessary in only two

cases following bronchoscopy. This low percentage has been due to the observance of three of our bronchoscopic fundamentals, namely:

1. Proper size tubes with the head held in the correct position.
2. Muscular relaxation.
3. Short working time.

Esophageal foreign bodies as a rule lodge at the level of the first constriction, the cricopharyngeus muscle. Open safety pins, point up, are easily removed if above the cricopharyngeus muscle. When below this point, they usually pass into the stomach and are recovered from the bowel.

It is perfectly safe to leave the foreign body (open safety pin) in the stomach for three weeks if X-rays at intervals show the point in different positions. Open safety pin point down does not constitute a mechanical problem. We have had six cases of open safety pins in the air and food passages and no deaths. Two passed into the stomach and were recovered, one in a thirteen months old baby and the other in a child three years old.

Those of you who have had experience in this work will agree, I am sure when I say that there is no branch of surgery or medical practice that requires the same degree of precision, promptness and accuracy in the recognition of anatomical landmarks and *cooperative team work* as does endoscopy. It is not a "*one man job.*"

Department of Bronchoscopy,
Gill Memorial Eye, Ear and Throat Hospital.

DISCUSSION

DR. E. U. WALLERSTEIN, *Richmond:* I shall not go into detail in the management of these cases. First, I think Dr. Gill is to be congratulated upon the presentation of his paper and the results that he has attained. I cannot agree with him about anesthesia. I believe anesthesia in bronchoscopy and esophagoscopy is like anesthesia in any other surgical procedure; one must choose his case. If an esophageal foreign body is large and there is considerable spasm, I believe that general anesthesia is indicated; or if the foreign body is very irregular, or pointed, again I say general anesthesia. However, all of us who do bronchoscopy have found out through practical experience that we can go beyond Young's rule in giving morphin; we go considerably beyond Young's rule; and I do not believe that we injure the youngsters, and we get good relaxation.

I believe that in a mixed audience such as this, consisting more of general men than bronchoscopists, a word should be said about the management of the case before the patient reaches the bronchoscopist. Dr. Gill has brought out very well that there is no occasion for excitement. More harm is often done by ill considered measures. I have had several cases in which the doctor has tried to use a bougie, either in pushing down the foreign body or pulling it up, and real trauma has been done and considerable risk has been taken, to the injury of the patient. There is, however, one type of foreign body that needs immediate attention, and that is a peanut in the bronchus. There hours count, and it is incumbent upon the attendant to see that bronchoscopy is done as quickly as possible.

DR. CLAUDE MOORE, *Washington:* I think it is very unfortunate that Dr. Gill could not have been at the beginning of the program this afternoon, when there were quite a few laymen here.

It is very consoling to find the number of good bronchoscopists in cities of forty thousand people and above. I live in Washington, and I see in the newspapers, every two or three months, articles about people coming from as far away as Arkansas and Mississippi, going to Philadelphia, to Chevalier Jackson.

Doing nothing but radiology, I should like to emphasize again the value of X-rays of the chest in chronic conditions. Large numbers of institutions now will not admit employees until they have had X-ray examination of the chest to rule out not only tuberculosis but also other chronic conditions. As you may know, the Mayo Clinic X-rays the chest routinely in all diagnostic cases. They will not employ a doctor there without an X-ray examination of his chest. Yale University makes an X-ray examination of the chest of every student on admission. Frequently conditions will be found such as Dr. Gill has mentioned. Unsuspected foreign bodies may remain in the chest for years. By means of the fluoroscope, particularly using all diameters, lateral and antero posterior, the bronchoscopist is frequently able to use his forceps and get hold of an opaque foreign body in the lung tissue, pulling it through the scar and fibrous tissue without ever having seen the foreign body except in the fluoroscope. Quite often the radiologist, by means of the fluoroscope, can be of a good deal of value to the bronchoscopist, just as he is to the surgeon in setting fractures

DR. THOMAS E. HUGHES, *Richmond:* I enjoyed exceedingly Dr. Gill's report of his cases. I merely want to show one or two slides of cases that we have had in the last two or three weeks.

This first case (slide 1), is one in which an adult lady swallowed a safety pin one night. She was hanging some curtains and put a couple of safety pins in her mouth; someone said something to make her laugh, and she swallowed one of them. The pin is just below the diaphragm. We gave her H. M C. hypodermically and with the use of a little cocain introduced the esophagoscope. It did not reach the pin, however, and I thought it had passed into the stomach. With the aid of the fluroscope we found the pin in the same location, so we introduced a longer esophagoscope. The point of the pin was up, which, of course, makes removal more difficult. The patient went home the following day and made an uneventful recovery. Dr. Gill's method, as he said, is to leave the pin alone when it has passed that far and perhaps recover it later. In this case, however, we got it out all right.

Slide 2 shows a peanut in the right main bronchus of a little girl sixteen months old. A small sister was feeding her peanuts. This happened last Monday. Saturday night the family physician was called in; she had had no attention until that time. He got the history of the child having eaten peanuts and called up the hospital, and we were called in to see the case. The X-ray demonstrates very prettily the case on inspiration and expiration. The

XUM

foreign body is in the right main bronchus and illustrates the obstructive emphysema of which Dr. Gill spoke. The air can get into the lung but can not get out. As you all know, the diameter of the bronchus is larger on inspiration than on expiration, so the air goes into the lung, is trapped, and can not get out. The diaphragm is shoved down on the side of the foreign body and is up on the other side. On expiration, as the air is expelled from the left lung (the unobstructed side), the mediastinal structures come further to the left side, and the diaphragm extends higher on expiration on the left side than it does on the right.

There is one interesting thing about this case. Although the peanut had been in the bronchus for practically six days, there was very little inflammatory reaction in the bronchial tree.

This case was done without any anesthesia. She was given (sixteen months' old), 1/24 of morphin and 1/450 of atropin. The bronchoscopy was done Saturday night, and she went home Sunday morning and has gotten along nicely since.

We are told that vegetable foreign bodies produce a great deal of inflammation in the bronchial tree, but there was very little inflammation in this case. This was a salted cooked peanut. We had another case, a few weeks ago, that had inspired a raw peanut. That occurred at eight o'clock in the morning and that night, when it was removed, there was a very marked inflammatory process.

DR. E. T. GATEWOOD, *Richmond:* I think one point might be stressed in these cases, and that is in the diagnosis or the probable diagnosis. I shall exemplify my remarks by illustrating a case that was referred to me sometime last year. This child gave a history of feeding chickens, and a chicken flew up in his face while he had some corn in his mouth. He had a choking spell and a crying spell, but after that went on with little difficulty. A physician was called three or four days later, because the child had some fever He treated the child for a week and. when he did not improve, sent him to Richmond for examination. He went to a well-known hospital and was examined by an internist, who sent him back to the referring doctor with a probable diagnosis of whooping cough. The parents were dissatisfied, so they changed doctors in the rural district. The next doctor treated the child for a few days and sent it to a town where they had a hospital but did not have facilities for removing foreign bodies. so the child was sent back to Richmond. He came to Johnston-Willis Hospital, where we found a grain of corn in the right bronchus and removed it. Now, that child was nearly moribund. If these cases are not recognized early, often there is little that can be done to save them.

I think Dr. Gill makes a good point in the use of general anesthesia in selected cases. Dr. Jackson does not use it at all, and I think some of the other Northern clinics do not use it. Some of these cases take general anesthesia well, and it saves them a lot of torture and mental anguish. In many ways it is a great help

I can not agree with Dr. Gill in leaving a safety pin in the esophagus, especially if the point is downward. I believe if it were in my child I should want it removed.

We are indebted to Dr. Gill for this splendid presentation of these interesting cases.

DR. GILL, closing the discussion: I should like to thank the gentleman for their discussion.

Answering Dr. Gatewood, he misunderstood me with reference to the open safety pin, point down. Those are never left in; they will never pass. I was referring to the open safety pin with the point up.

With reference to what Dr. Moore said, and referring to the articles that have appeared in the lay press, I do not think the articles have been fair to the Southern cities where this work is being done. It is done successfully in Richmond, in Charlotte, N. C., in Atlanta, and in other places.

RENAL FUNCTION TESTS.

E. P. ALYEA, M. D., Durham, N. C.

Urological Division, Duke University School of Medicine.

Far back in the middle ages and in the days of the medicine-man, the doctor was always pictured as a man in flowing robes or fantastic costume holding in his hand a urine specimen glass. The late Dr. Warthin, of the University of Michigan, had a collection of old medical drawings taken from books in ancient Latin and Greek and in his collection the physician is always pictured in this manner. By close observation, sight, the odor and the taste of urine, physicians were supposed to be able to diagnose almost any disease. Hahn noticed the absence of the odor of violets in the urine of gouty patients after the ingestion of turpentine: Razer has noted the absence of that peculiar odor due to the ingestion of asparagus in the urine of patients with nephritis. There were countless observations of this kind made by the physicians of old. Today the doctor, it is true, pays some attention to the appearance, the color, the odor, the reaction and the clarity in making his usual routine examination of a specimen, but he also has developed other tests and observations which to him now seem much more important in giving him a true evaluation of the renal function.

During the last twenty-five years a great deal of work has been done in an attempt to develop an ideal renal function test. There have been countless ones proposed but most of them have fallen into disfavor almost as soon as they have been used. In the judging of a test of renal function, the practicability, as well as the efficiency, should be considered, and one should see that it has the following qualifications:

1. It should indicate within narrow limits the constant amount of work performed by normal kidneys.

2. It should indicate constant variations in function when constant abnormal conditions are present.

3. It should indicate functional alterations

with the development of histological changes when such conditions exist.

4. It should afford an indication of the absolute work accomplished as well as the relation of this to the normal standard under all conditions.

5. It should be applicable with a simple technique.

6. It should be applicable without injury to the patient and without exerting a strain upon the kidneys themselves.

7. The method should be mathematically accurate.

8. It should be easy of interpretation.

9. It should also be capable of revealing the latent or reserve force which can be used by the kidney when under strain.

Renal function tests as employed at present fall into two groups: First, tests of retention, namely, an estimate of the variation of substances normally present in the blood in fairly constant amounts; and, second, tests of excretion, namely, an estimate of the amount of certain substances normally present in the urine or of a foreign substance, a known amount of which has been administered. Probably the best habit of renal function determination is a combination of these two groups: that is, the union of a retention test and an excretion test. The physician of today perhaps does not help himself as he should to one of the best and most dependable tests of renal function which we have; namely, the specific gravity of the urine or the "Wasser Versucht" of the Germans. In Europe far more attention is placed upon this phase of examination than upon the more modern test of excretion. At the International Congress a few years ago Chabanier discussed this subject and gave us the modern European conception of the value of tests of excretion relative to the surgery of the urinary tract. In his paper there was a noticeable absence of references to clinical signs in individual cases but as a whole they depended more upon the specific gravity test plus the blood urea examinations. We found that Von Lichtenberg in Berlin depended very strongly upon the "Wasser Versucht" which is in reality a test of the kidney to concentrate the urine. The technique is as follows: 1,500 c.c. of tea is given in the A. M., and no other fluid is given all day, and (1) specimens are collected every hour for eight hours, and (2) the quantity of each specimen and the specific gravity are recorded. A normal test should show: (a) Difference of fifteen points in specific gravity, usually from 1.005 to 1.020. (b) The first four hours should show a quantity of more than 1,000 c.c. with a low specific gravity. (c) The last four hours should have a much greater specific gravity and the better the renal function the higher the specific gravity. It seems to me, however, that the specific gravity test is not easily applied to the majority of our prostatic cases and does not so well fulfill the necessary requirements for us. It does not show particularly well the improvements in renal function as we would have it. In the last couple of years in France there has been a change in their habit of renal function determinations and particularly in Marion's Clinic. They tested out very carefully the various renal function tests and have come to the conclusion that the phthalein test plus the blood urea examination are the two most reliable renal tests. In the United States the attitude at present is similar but in addition we feel that the renal tests supplement and do not supplant direct observation of the patient; that the additional information gained from these renal tests is, however, indispensable; that no single test in itself is conclusive evidence of the exact health of the kidneys but that they are merely more evidence gained in completing the clinical picture which we are trying to construct of the whole individual patient. Today we are hearing a lot for and against the specific gravity determination as a differential renal function test. It seems to be quite reliable in the majority of cases but not perhaps as accurate as other ones at our disposal. However, we think, as a rule, we in this country do not pay sufficient attention to the knowledge obtained from simple specific gravity tests.

The second important test of retention is a measurement of the blood urea or of the blood urea nitrogen. We use the blood urea inasmuch as the laboratory technique of its calculation is very simple and accurate. We prefer it to the more laborious tests of the urea nitrogen or the other nitrogenous products of metabolism in the blood. The technique can be carried out by any physician in his office and takes no more than ten minutes. The method as used in our clinic is as follows: 5 c.c. of oxalated blood are added, drop by drop to

XUM

5 c.c. of 10 per cent trichloracetic acid in a centrifuge tube. The contents of the tube are thoroughly mixed and centrifuged for about five minutes. If a centrifuge is not available the mixture may be filtered, though this is less rapid and convenient, and may necessitate the use of more than 5 c.c. of blood to obtain 5 c.c. of filtrate. Five c.c. of the clear protein free filtrate are then titrated with 5 per cent bichloride of mercury. The mercury solution is added from a burette until a test drop of the mixture when added to a drop of saturated sodium carbonate on a porcelain spot plate gives a reddish-brown precipitate which appears in three seconds. It is important to mix the bichloride and filtrate very carefully and thoroughly before removing the test drop. A yellow precipitate may occur before the reddish brown, but the titration must be continued until the precipitate becomes reddish brown *promptly, within three seconds.* A minimum of 1.5 c.c. of mercury solution can be added before test drops are removed. As few test drops as possible should be removed.

Example: (No. of c.c. of bichloride sol. required) X 40 = Y

Y — 60 = (mgm. of bl. urea per 100 c.c. of blood).

(This is the blood urea and not the urea nitrogen.)

We consider the normal between 20 and 40 mgm. of urea per 100 c.c. of blood. There is this amount of variation caused, we must remember, by the difference in diet and fluid intake. In using this test as an indication of the functional capacity of a surgical kidney we are not so demanding that it reach the normal limits as we are that it become stablized. By this we mean the blood urea, say in a case with urinary obstruction, does not have to drop to 30 or 40 mgms., but it must become stabilized over a period of a week or two, even though that amount may be much higher than normal. For example: If a patient has been drained with a urethral catheter or a suprapubic tube for two or three weeks and a blood urea is taken every other day or so and this shows a drop from 150 to 60 mgms., and then remains at 60 mgms., say for a week or more. we consider that this patient, providing his other tests corroborate this, has reached the optimum of kidney function and that this slightly elevated blood urea is no contraindication to operation. As corroborative tests we use the non-protein nitrogen of the blood, the uric acid and the creatinin determinations. All these tests of retention are no direct index of the excretory ability of the kidney nor of the renal reserve, but rather show whether or not the kidney is able to excrete the normal amount of nitrogenous waste products in its present status. They do not tell us whether the kidney will be able to hold its own when an added strain is applied.

We believe that the measurement of creatinin as a functional test of the kidneys is poor, inasmuch as this product of metabolism is the last of the three—urea, uric acid, and creatinin—to be affected by renal insufficiency. It is known that very considerable diminution in renal function must occur before there is any rise in the blood creatinin level. Recently there has been some new work done on the measurement of blood creatinin after the injection of a certain amount of this substance into the blood stream. Tests are then taken to discover the amount and the rapidity of excretion in the urine of this product of metabolism. However, the whole technique, the giving, the collecting and the reading of this test, we believe is too complicated for practical usage. About 1914 Ambard was working on the interrelationship of the amount of urea in the blood and in the urine. He figured out a formula which was called "Ambard's Constant," or the ureo-secretory constant. This was the measurement of the urea excreting power of the kidneys. However, this test must be carried out very accurately and precisely in order for it to be of real value and the possibility of error is too great. The French urologists have compared this method very carefully with that of the blood urea and the phthalein tests and have discarded it almost entirely. Recently in this country Van Slyke has brought out the "Urea Clearance Test" which is very similar to "Ambard's Constant." It is recorded by measuring the number of c.c. of blood per minute cleared of urea by renal excretion and is expressed: $\frac{U \text{ (Urine Urea)}}{B \text{ (Blood Urea)}} \sqrt{\text{Vol.}}$ Van Slyke has worked with this test for over ten years; trying it out in various kinds of nephritis and comparing it with the phthalein excretion. The urea clearance test shows the relationship between blood urea, urine urea and urine volume. If the patient is putting out less than 2 c.c.

of urine per minute, the urea output increases in proportion to the square root of the urine volume but when the volume reaches this amount, which is the low limit of normal output, the urea excretion has attained its maximum and is unaffected by further increase of volume output. He found out also that in patients with slightly diminishing renal function the blood urea clearance shows evidence of disease before a diminution in phthalein secretion is noticeable. He says that only after the urea clearance falls as low as 20 per cent of the normal, do they find abnormal phthalein and retention tests. However, the fault in his work, we believe, is that he took merely the two-hour phthalein excretion rather than the fifteen-minute phthalein collections. This is a very important point and, as we shall show later on, is particularly essential in medical cases such as those with which he dealt. We know that there is always evidence of renal disease in the phthalein excretion when collected every fifteen or thirty minutes before there is elevation in the nitrogenous waste products of the blood. But he also found out that, conversely, in the improvement of renal function the phthalein test shows the change earlier than the urea clearance test.

There is one other test of retention or rather of urine examination which should be mentioned and that is cryoscopy or the determination of the freezing point of urine. A few years ago this was thought to be of great importance and that it might replace other renal function tests. However, the technique of the determination of this factor was too complicated and not sufficiently accurate to make it of practical use.

The second large group of renal function tests is one of excretion. A known amount of substance is injected into the blood stream and the amount excreted in the urine is measured. In the last twenty years there have been many of these substances brought forth, tested, and most of them have been discarded as quickly as they have been used. Among these are potassium iodide, lactose, diastase, rosanilin, methylene blue and phloridzin. Rosanilin was a good drug in many ways but it took about twenty hours for a complete elimination. Phloridzin was thought to be, for a time, a measure of glomerular function but it is now known that it does not stimulate the kidney to synthesize sugar, but rather increases the permeability of the kidney for the excretion of sugar. This test has now been found to be unreliable and unsatisfactory as a renal function test and has been completely discarded. Methylene blue was very popular about 1897 when Achard and Castaigne first demonstrated its application in renal excretory tests. However, its faults far overbalanced its advantages. Its exact determination is very difficult as only approximately 50 per cent of the drug injected is excreted in the urine. The color of the dye is readily influenced by the color of the urine; the dye undergoes chemical changes in the body and is sometimes completely destroyed by the body tissues. The excretion of methylene blue lasts over far too long a period, sometimes being present in the urine as long as four or five days after injection. However, in diseased kidneys its appearance is delayed and excretion retarded and diminished similar to other drugs. Methylene blue, however, is cumbersome and very rough as a test of renal function and has been practically universally discarded.

The two drugs of most common usage among physicians at the present day are indigocarmin and phenosulphonephthalein. The former was experimented with by Heidenhein in 1900. He worked on the physiology of the kidneys; and in 1903 Voelcker and Joseph used it clinically in estimating the total and comparative renal function. Apparently, only about 25 per cent of this is excreted by the kidneys and the total excretion is not completed until twenty-four hours after the injection. Colorometrically it cannot be read very accurately because it is a suspension and not a solution. However, there has been considerable usage of this drug both in this country and abroad, particularly, for differential renal function. Its method of injection is either intramuscular or intravenous. Wildboltz of the University of Bern told us that he preferred the intramuscular method because he feels that by this method he can better visualize slight impairment in one kidney or the other. If the dye is given intravenously, he says the kidney receives such a large amount all at once that even a moderately diseased kidney can put out some of the dye and usually a good deal of it immediately; while, if the dye is given intramuscularly, the kidneys receive the dye more slowly and in less concentration and, therefore, its appearance may be

XUM

retarded in one or the other kidney and its diminished excretion from the diseased kidney more easily detected. Therefore, he thinks that a slightly diseased kidney would be more readily diagnosed by the intramuscular than it would be by the intravenous method. Others in this country believe that the intravenous administration is the more accurate. Thomas in Philadelphia has written a good deal on this subject and brought out the "index of elimination" in which he compared the first twenty-minute period to the third twenty-minute period, and concluded that if the index was over one the patient was in a satisfactory state for operation, while if it was less than one the patient's renal function was not good enough for an operative procedure. He also found that in the normal kidney five times as much of the dye was excreted in the first twenty minutes than in the third twenty-minute period; and that the third period in the diseased kidney often showed a greater excretion than the first. He concluded that the three important factors in using this dye as a function test were: (1) the appearance time; (2) the total output; and (3) the index of elimination. However, we feel that the main advantage of this dye is not as an accurate renal function test so much as it is a great help in chromocystoscopy. For instance, in cases of tuberculosis of the bladder or of a very severe cystitis, where the ureteral orifices cannot be seen, after the dye is given and one observes the orifices through the cystoscope, they can very often be picked up in this manner; but as a test of total renal function, we know of no one who claims this drug to be as efficient as phthalein. B. A. Thomas, who was probably its most ardent advocate, said "the index of elimination of phthalein and the blood urea nitrogen has served well and faithfully. There are none better or more reliable."

The invention, pharmacology, and clinical application of phenosulphonephthalein makes a most interesting story. Ira Remson in 1885 described the drug. However, nothing was done with it then and it was laid on the shelf. In 1909 Abel and Rowntree, looking for a drug suitable for renal function tests, experimented with phthalein and pointed out its excellent properties. In 1910 Geraghty brought forth a beautiful piece of work showing the clinical application of phenosulphonephthalein as a renal function test. An interesting note here is that Remson by this time was President of the University in which all the work on this drug had been done. He had noticed that his mental faculties were not as clear as they had been and for this reason resigned from his important office. He then came into the hospital and through the application of phthalein, the same drug which he had discovered twenty-five years before, it was found that his renal function was markedly impaired and that he was in a state of mild uremia. This had been caused by urinary obstruction; when this was relieved, he again became as alert mentally as he had been years before. It is said that he then regretted exceedingly having given up his presidency. The story of the first clinical application of phthalein is also rather interesting. The first human case upon which the phthalein test was employed was No. 1932 of the Brady Urological Institute. A few days before this test was applied, to quote Dr. Young, "Dr. Rowntree had presented to the Interurban Surgical Society experimental work on a dog in which he had ligated one ureter and brought it out in the loin. Following this he had introduced uranium nitrate into the renal artery to produce an experimental nephritis. Phenosulphonephthalein was subsequently injected into the dog and a study of the divided urines showed that more of the dye was excreted through the kidney which had been operated upon than through the unoperated kidney. From this Dr. Rowntree deducted that phenosulphonephthalein was eliminated more rapidly by a diseased kidney than by a healthy one. He asserted that he thought he produced an experimental nephritis by the injection of uranium nitrate; this kidney excreted more of the phenosulphonephthalein than the other, presumably normal side. Following this demonstration I talked to Dr. Rowntree. I told him I had on the ward a patient who presented exactly the same condition as his operated dog, i. e., the right ureter was blocked and all the urine was coming out through the right loin, following the operation upon the right kidney. I, therefore, proposed that phenosulphonephthalein be injected into this patient. Dr. Rowntree came to Ward C, and gave the patient, in my presence, an injection into the right arm of 1 c.c. of 6/10 per cent solution of phenosulphonephthalein. Urine was collected from the fistula in the right side and by catheter from

the bladder. I do not remember for what length of time it was collected, but on the following day Dr. Rowntree informed me that this case confirmed absolutely his experimental work on the dog, i. e., more phthalein was excreted from the fistula in the right side than through the left ureter which opened into the bladder from which the urine was collected by a catheter. Within a few days after this experiment the patient developed a fever and marked pain and swelling in the left side. A large mass was easily palpable in the region of the left kidney and the patient became rapidly uremic. By a hasty operation I exposed the left kidney and found it was a mere shell and filled with pus. It is evident, therefore, that at the time the experiment with the phthalein was carried out by Dr. Rowntree the left kidney was really the bad kidney and the phthalein test simply showed that a bad kidney excretes less than a comparatively good kidney. Other patients in which the test was tried after this confirmed our findings in this case and it was promptly demonstrated that phthalein was eliminated more rapidly and in larger amount by a good kidney than a bad one. "The deduction which one draws is that the intra-arterial injection of uranium which Dr. Rowntree carried out produced congestion and probably hyperemia of the kidney with increase in its functional capacity. Perhaps nephritis with impairment of function might have come on later or it is quite possible that the dosage of uranium nitrate used was too low to produce nephritis at the time Dr. Rowntree made the phthalein test."

It is now known that 95 per cent of the injected phthalein is excreted by the kidneys and that it is not taken up or destroyed by other body tissues; not until there is such profound cyanosis that it endangers the life of the patient, do the tissues destroy this drug. Furthermore, 75 per cent is excreted within the first one and one-half hours. It has been noticed also that in edematous patients the extent to which the phthalein is retained in the tissues is influenced by the degree of acidosis. When the tissues are rendered alkaline they readily liberate it. Ether or gas-oxygen anesthesia are known to slightly diminish the secretion of phthalein.

Since the introduction of phenosulphonephthalein as a test of renal function considerable physiological and clinical work has been done with it. The apparent specificity of the kidneys for secreting this drug is most remarkable. They seem to be able to pick the phthalein from the blood and concentrate it even when there is little urine being secreted. In the physiology of the kidneys, the glomerular function is thought to be one of secretion alone while the tubular function is one of reabsorption into the blood and, in addition to this, also some secretion. Marshall and others have shown that phthalein is secreted by the convoluted tubules of the kidney and not by the glomeruli. Experiments based on the local injury to the tubules by means of poisons, such as mercury bichloride, convince us that the tubules are the main seat of phthalein elimination while in the vascular type produced by arsenic, the injury here is primarily glomerular and there is no change in the phthalein secretion at the beginning. Microscopic localization of the drug in the cells of the convoluted tubules in the non-secretory kidney leaves little doubt but that this is the specific part of the kidney which secretes the dye.

We now consider the clinical applications of phenosulphonephthalein. This test gives alone the excretory capacity of the kidneys but does not tell us whether this capacity is sufficient to meet the requirements of elimination in a particular individual. However, when this test is combined with a retention test such as the blood urea, we have then an estimate of the reserve power of the kidneys and we know also whether or not the function of the kidneys at the present time is sufficient for the nitrogenous elimination of that particular patient. We realize, however, that it is not altogether an ideal renal function test; it does not give us the type of kidney lesion present and may give us a relatively erroneous impression of some patient's condition. If the test is done as is now the general custom of collecting two hourly specimens, often it is apparent, clinically, that the patient has improved markedly, as in an obstruction case on catheter drainage, and yet the two-hour phthalein output may not have improved appreciably; or one patient with a two-hour phthalein excretion of 40 per cent may have a beautifully smooth and uneventful convalescence, while another with a better total output may develop post-operative uremia and die. The experienced surgeon has learned to supplement the phthalein test with careful clinical observation and blood studies

XUM

so as to avoid just such experiences. The reliability of the phthalein test has recently been emphasized by Young in an article in which he shows many pathological kidneys and along with them their phthalein excretion curves. The correspondence is surprisingly accurate. The internist sees many cases of acute nephritis, chronic parenchymatous nephritis and cardio-vascular hypertensive renal disease that have a normal two-hour total phthalein output even when the disease may have reached a fairly advanced stage. This has caused him to look with doubt and uncertainty upon the results of this test, while in reality the truth was there before him if he had but refined his technique. There is, therefore, a real need for a more reliable method of determining the type and extent of renal lesions and a more accurate measurement of the reserve power of the kidneys.

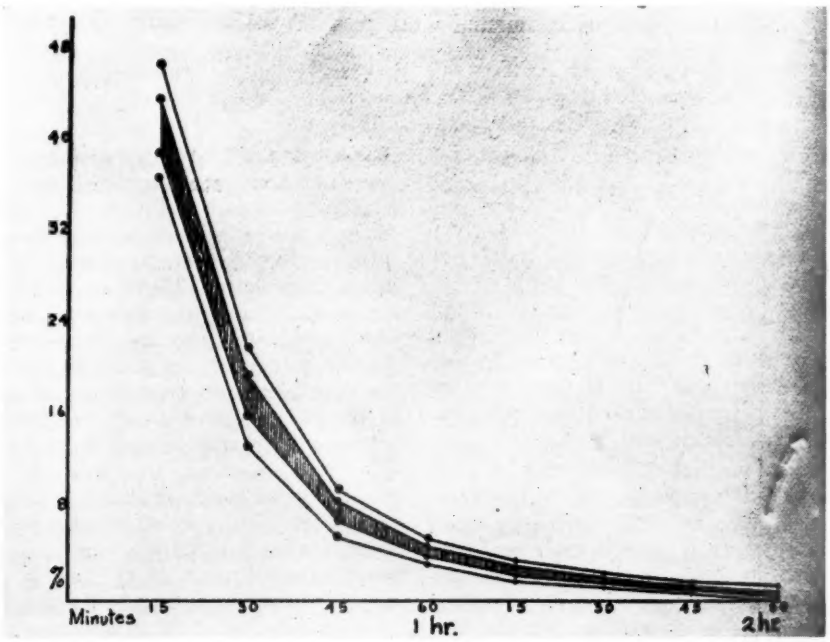


Chart 1.—The variations of the normal fifteen-minute interval curve of phthalein elimination as determined by 44 tests on 23 normal individuals (Shaw).

The clinical problem involved in the phthalein test for renal excretion may not be alone whether the kidney itself is capable of excreting it, but rather whether the kidney has a chance to excrete it. For instance, a patient with cardiac failure or with edema of the tissues for any reason whatever might have a delayed appearance time and diminished output because there is delayed absorption of the drug when it is given subcutaneously or intramuscularly. It is important, therefore, to consider the three methods of administration. Of these three techniques, subcutaneous, intramuscular, and intravenous injection, the last is much the preferable for practically all cases where merely the renal function is desired. However, if a more complete understanding of the condition of the body tissues is desired, the intramuscular or subcutaneous injection is preferable. In cases of cardiac insufficiency the difference in the results between the intravenous and the intramuscular may be a fair index of the comparative degree of cardiac and renal impairment. That is, greater delay in excreting means greater cardiac insufficiency. In cases of chronic passive congestion of the kidneys there is a slight decrease in the phthalein output even when there is no nephritis present, and as the cardiac condition improves the phthalein also increases in amount. However, if there is true kidney damage, as the circulation improves the phthalein does not correspondingly rise.

As we have said, the reason for the suspicious

view internists have of the reliability of the phthalein test in acute, subacute and chronic nephritis is based probably on their personal experiences with phthalein two-hour collections. It has been found that for their cases a more careful method of collection is essential. Shaw in 1924 worked out the normal curve of phthalein excretion. He used the House Officers as subjects and had them collect their specimens every five minutes. In a second

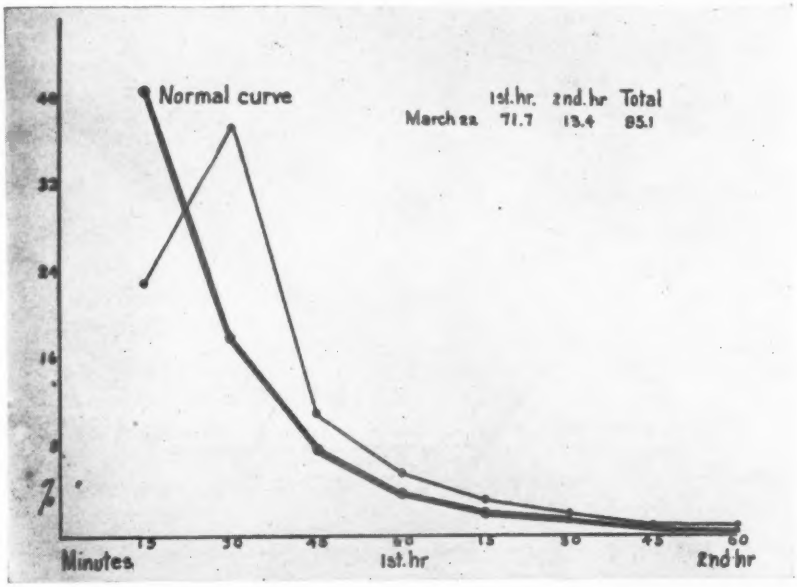


Chart 2.—Curve of phthalein elimination in a case of subacute nephritis. The normal curve is shown for comparison. The other renal function tests in this case were negative (Shaw).

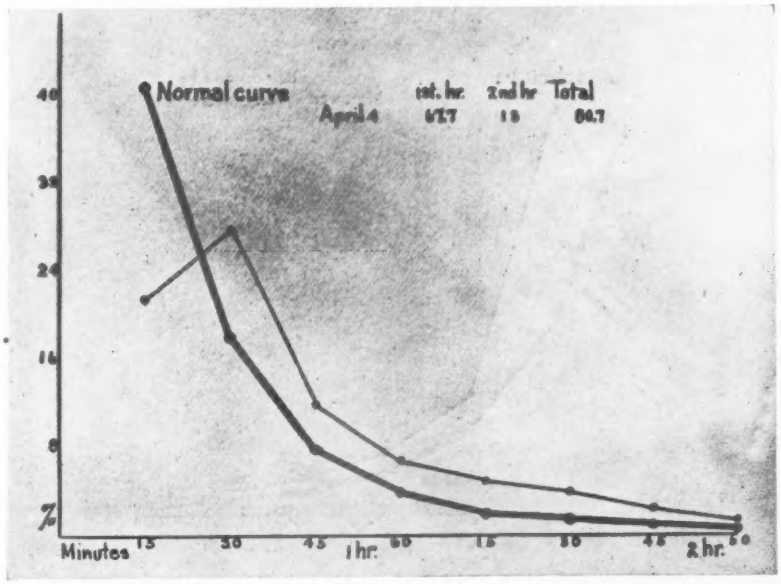


Chart 3.—Curve of phthalein elimination in a case of chronic parenchymatous nephritis. The normal curve is shown for comparison. The other renal function tests were negative in this case (Shaw).

XUM

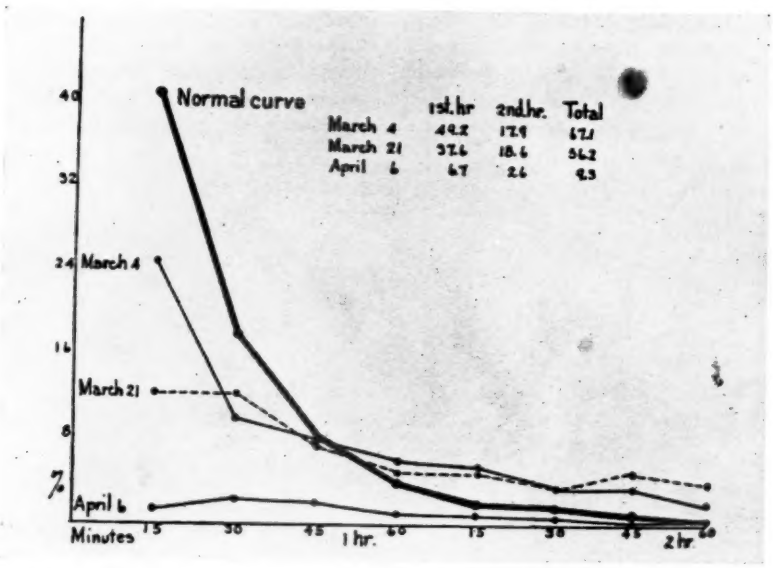


Chart 4.—Repeated curves of phthalein elimination in a case of cardiovascular hypertensive renal disease (Shaw). The normal curve is shown for comparison.

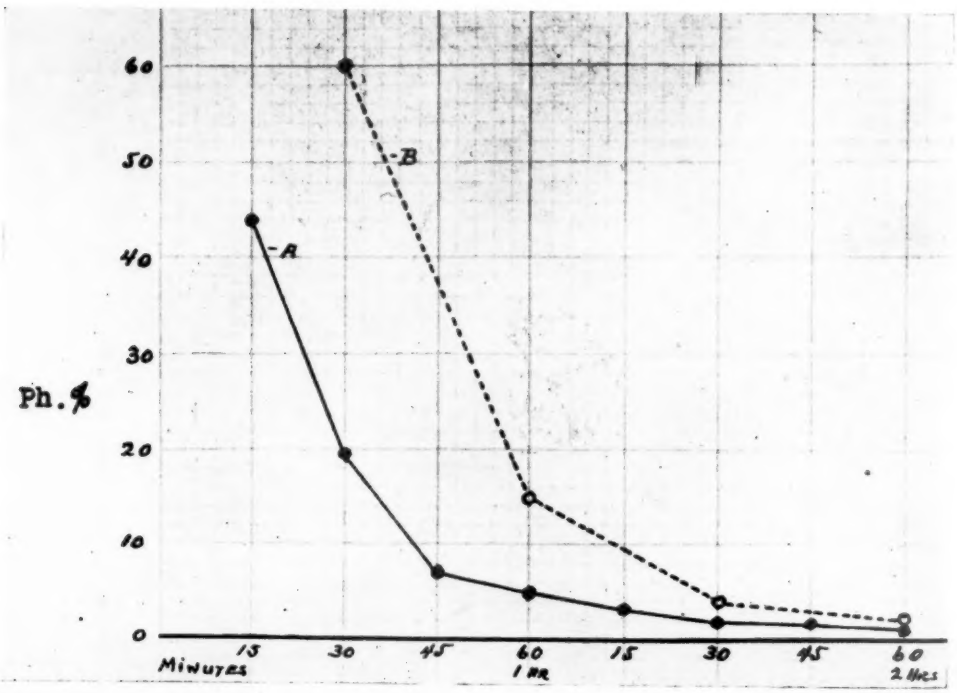


Chart 5.—Curve A is the phthalein excretion of a normal individual with collections every 15 minutes. Curve B is one of the same individual with collections every 30 minutes. It is evident that the character of these two curves is essentially the same.

series of cases he did forty-four tests on twenty-three normal individuals, taking collections every fifteen minutes. He found that this longer period gave the same characteristic curve as the five-minute period collections. Chart No. 1 shows the slight variation in these curves and gives the composite normal curve of phthalein excretion. It is seen that the greater part of the drug is excreted in the first fifteen minutes and that it drops off rapidly in the second and third fifteen-minute periods, so that by the end of an hour the excretion is at a very low level. It was found by clinical application that fifteen-minute collections were necessary for accurate determinations of renal function in medical cases, such as subacute or chronic nephritis and cardiovascular hypertensive renal disease. In a subacute nephritis, as shown in Chart No. 2, if collections had been made at the one and two-hour periods, the internist would have been justified in looking with disdain on this renal function test, for the patient had a 71.7 per cent output in the first hour and a two-hour total of 85 per cent—a very good excretion. However, if collections had been made every fifteen minutes, it becomes quite evident that the excretion is not normal, as shown by the curve in contrast to the normal one inserted for comparison. Here, the greatest output is in the second fifteen-minute period and not in the first. The same is true of a case of chronic parenchymatous nephritis. The hour excretion is 67.7 per cent and the two-hour total 80 per cent. However, the abnormality in this curve is shown in contrast to the normal. Then in a case of cardiovascular hypertensive renal disease, we see a first hour collection of 49.2 per cent and a two-hour total output at 67 per cent. Here, too, the curve is far below the normal in the first two fifteen-minute periods and then crosses the normal to raise the output in the second hour collection. This chart shows, too, the lowering or flattening of the curve as the renal function becomes worse, until the third curve shows merely a flat line which is evidence of very serious renal damage.

As we have said, Shaw found that fifteen-

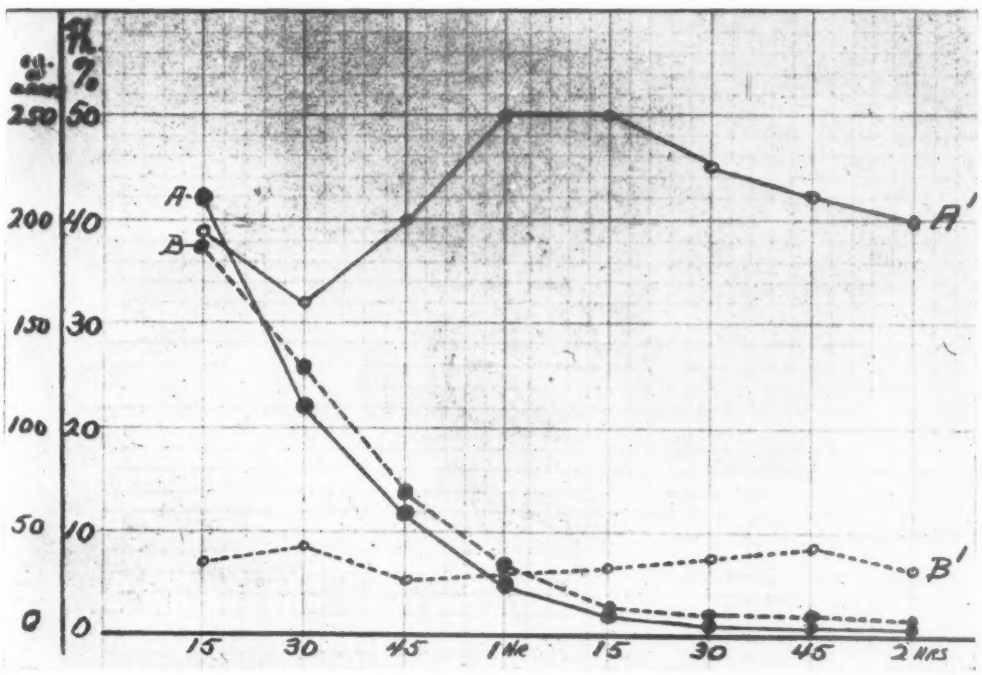


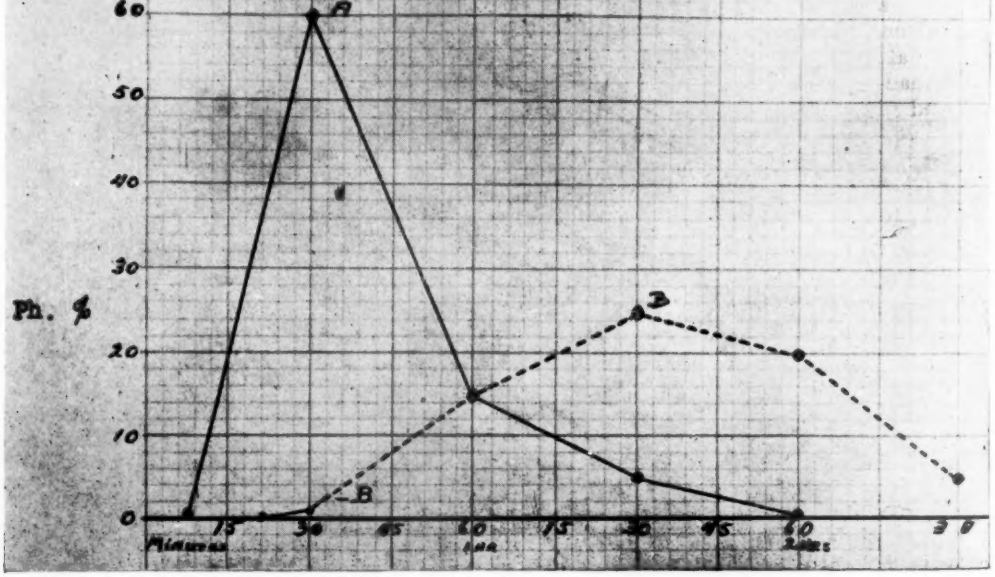
Chart 6.—Curve A shows the phthalein output of a person who is voiding large quantities of urine, between 200 and 250 c.c., every fifteen minutes as shown in Curve A'.
Curve B is one of a patient with limited fluid output, voiding less than 50 c.c. every 15 minutes, as shown in curve B'. It is quite evident that these two curves are almost exactly the same, having the same character and the same percentage of phthalein excretion. This shows that the amount of phthalein excreted is not dependent upon the amount of urine excretion, providing the patient is putting out at least 40 c.c. every 15 minutes. So that the general opinion that patients must have water forced in large quantities in order to get a good phthalein execretion is erroneous.

XUM

minute collections gave the same type of curve as five-minute periods, just so we have found that thirty-minute periods of collection give the same characteristic curves with the greatest part by far of the phthalein being excreted in the first half hour period. We see in Chart No. 5 that the two curves are practically parallel. Because of the impracticability of taking fifteen-minute collections clinically, we have been taking our specimens every thirty minutes and find that it is perfectly satisfactory in our cases of urinary obstruction or other so-called surgical kidneys.

As has been pointed out before, we have found that the percentage output of phthalein is not dependent upon the quantity of urine excreted. In Chart No. 6, this normal individual has practically the same phthalein curve when he is excreting over 200 c.c. of urine every fifteen minutes as he has when he is putting out only 40 c.c. every fifteen minutes. We feel, therefore, that as long as each kidney is putting out 1 c.c. per minute, or from both kidneys 60 c.c. per half hour period, the phthalein excretion is accurate. As a matter of practice, however, we usually see to it that the output is more than that so as to cut down any probability of error. A normal individual will excrete 60 per cent of phthalein or 1 per cent per minute from each kidney, for the first half hour after injection.

The important factors in interpreting the phthalein curves are: the appearance time, the amount of phthalein excreted in the first half hour and its relation to that excreted in the second, third and fourth half hour periods. Reading the curves with these points in mind gives us at a glance an accurate idea of the patient's renal function and his renal reserve. Chart No. 7 shows a normal curve as con-

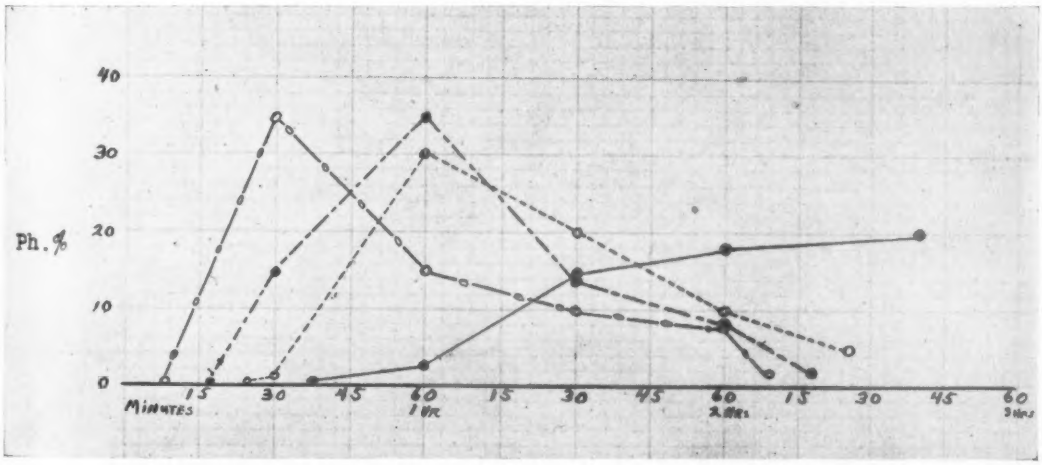


APPROXIMATE TIME	½ Hour	1 Hour	1½ Hours	2 Hours	2+ Hours	Total
A— 5 minutes	60	15	5	Trace	.....	80
B—20 minutes	Trace	15	25	20	5	65

Chart 7.—Curve A. Normal phthalein execretion curve is shown in contrast to Curve B, a case of urinary obstruction. In Curve B we see the delayed appearance time with the curve rising slowly to its apex at one and a half hours. In the normal curve this peak is seen in the first thirty minutes. Curve B in character is just the opposite of Curve A which rises abruptly in the first thirty minutes. Curve B is seen to rise slowly and fall slowly so that at the end of 2 hours there is as much as 20 per cent still excreted. The two-hour totals, however, for these two curves vary only 15 points, so from the totals alone one would not obtain a correct impression of patient B as contrasted with patient A.

trasted with one that we see very often in cases with chronic urinary obstruction. It is seen that the appearance time in the abnormal curve is twenty minutes instead of five minutes. In the first half hour only 15 per cent is excreted instead of 60 per cent as in Curve A. And after one hour the abnormal curve is rising while the normal is falling rapidly. Then by the one and one-half hour period Curve B is at its peak 25 per cent, while the normal curve has fallen to only 5 per cent. In other words, the two curves are exactly the opposite in architecture, one falling rapidly from its peak at thirty minutes and the other rising slowly to its peak at one and one-half hours. This case which we see so often in chronic urinary obstruction differs from that seen in subacute or chronic nephritis as is shown in Charts No. 2, No. 3, and No. 4 where the appearance time was about normal and the greatest amount of phthalein put out in the first half hour period, but markedly diminished and the curve tending to take on a flat line as the condition becomes worse.

The following charts are presented to show the graphic representation of the phthalein excretion in cases of chronic urinary retention. In these we see the changing of the character of the curve as the patient's renal condition improves. The curve is seen to approach nearer the normal standard, i. e., the greatest amount of drug being put out in the first half hour period and followed by a rapid fall. In addition we see the appearance time of excretion moving toward the point of injection. In Chart No. 8 we see a very poor curve of excretion with an appearance time of thirty-eight minutes and the curve taking on a form exactly opposite to the normal, so that at the end of two hours and forty-five minutes when there should normally be no phthalein excreted at all we have the greatest amount, or 20 per cent output. This curve shows also that while the total two-hour collections for curves three and four are about the same, actually curve four shows a marked improvement in renal function as evidenced by the change of the apex of the curve from the second to the first half hour period. The same is observed in Chart 9 in which the last three curves show marked improvement, their appearance times moving from ten to six minutes and the peak of the



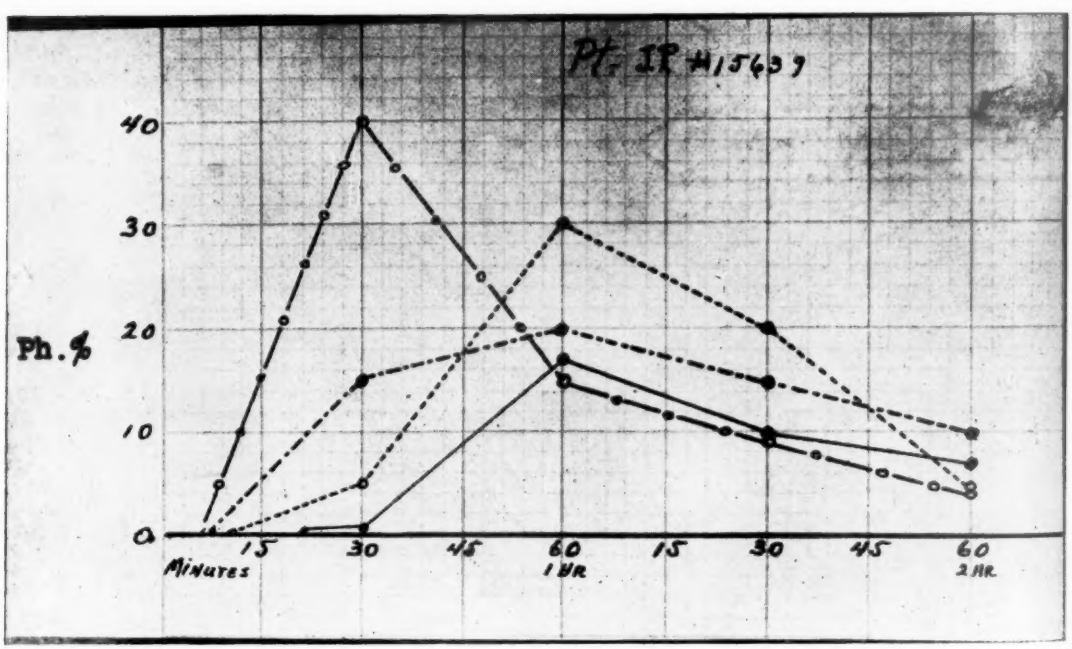
DATE	Approximate Time, Minutes	½ Hour	1 Hour	1½ Hours	2 Hours	2+ Hours	Total
10/23/28 (1)	38	0	3	15	18	20	56
10/25/28 (2)	27	Trace	30	20	10	5	65
11/ 3/28 (3)	17	15	35	13	8	2	73
11/ 6/28 (4)	8	35	15	10	8	2	70

Chart 8.—These curves are of a patient with urinary obstruction, and show the marked improvement in renal function from Curve 1 and Curve 2. The appearance time has shortened and the apex of the curve has changed from two and a half hours to one hour. There is still more improvement in Curve 4, the apex now being in the first half hour instead of the second. Curves 3 and 4 are equal for the first hour total but, as shown graphically, Curve 1 is very much better than Curve 2, since the apex has moved from the second to the first half hour period.

XUM

excretion curve from the second to the first half hour period. However, their two-hour totals are about the same. This is most important from a surgical standpoint, for we are led astray by a good total two-hour phthalein. That patient may, as a matter of fact, be right on the precipice of uremia and need only a slight jar to throw him over. We have very little warning of the impending danger from a two-hour or one-hour collection of phthalein. On the other hand, a thirty-minute collection curve gives us just such information, and we can therefore continue our preoperative care until such kidneys have reached their optimum functional capacity. We can then operate without fearing post-operative uremia. This is probably the greatest factor in lowering the operative mortality in prostatectomies of thirty years ago from 40 per cent to 4 per cent. Our pre-operative care now is very careful and painstaking. The patient is not subjected to operation until his renal function is at its optimum and within a fair range of safety.

The last three Charts, Nos. 10, 11, and 12, show the blood urea determinations which we always make along with our phthalein collections. As has been stated before, it is the combination of these two tests which gives us the best habit of diagnosis of renal function at our command. These curves show the rapid fall of the blood urea as soon as drainage is established, and as the renal function improves a stable level in blood urea is reached, usually within normal boundaries. But let me remind you again that it is not necessary for the level to be absolutely within normal limits, just so it has become stable at a moderately low level. Chart No. 11 emphasizes again the importance



DATE	Approximate Time, Minutes	½ Hour	1 Hour	1½ Hours	2 Hours	Total
6/20/31 (1)	20	Trace	17	10	7	34
7/10/31 (2)	10	5	30	20	5	60
7/20/31 (3)	8	15	20	15	10	60
7/28/31 (4)	6	40	15	10	5	70

Chart 9.—These curves are also of a patient with urinary obstruction. The four curves show the general improvement in this patient's renal function as measured by the phthalein output while the patient was on continuous catheter drainage. The last three curves show very definite improvement in functional capacity of the kidneys even though their two-hour totals are almost the same.

of the half hour collections. We see very little change at all in the two-hour totals of the last three curves of this chart. But by these curves it is quite evident that the kidneys have improved in renal function from a condition which would not permit operation to one of fairly satisfactory prognosis. In Chart No. 12 we see a very remarkable improvement in renal capacity, showing steady advancement of the appearance time from two hours to ten minutes and each succeeding curve slowly approaching the normal excretion type. This patient was watched carefully and seen to pass from an entirely inoperable condition to a fairly good operative risk, as shown by the phthalein curves. The last curve, taken after operation and the removal of the prostatic obstruction, shows the best curve of all. This curve now approaches most nearly the normal type, the greater amount of phthalein being put out in the first half hour and then dropping off rather abruptly to the second, third and fourth half hour periods. The appearance time also has moved up to almost within normal limits.

When one keeps such careful and frequent phthalein charts twice each week on pre-operative urinary obstructive patients, one can follow very closely and intelligently the renal function improvement in all these cases. These show graphically quite plainly whether the patient is improving as he should, and whether or not his condition will be sufficiently satisfactory to permit operative intervention. So, by a combination of the blood urea and frequent phthalein determinations made as shown here, we are able to get the best possible intelligent understanding of the patient's renal function and his renal reserve.

It would not be just to omit a word in re-

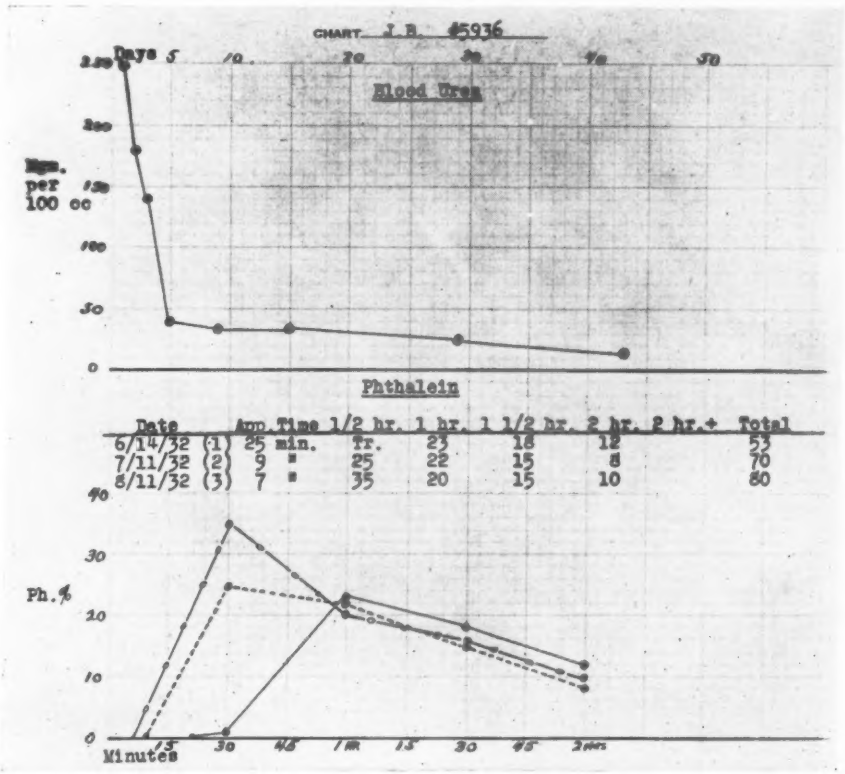


Chart 10.—This shows the improvement in renal function as measured by blood urea and also phthalein excretion when the patient was on catheter drainage. Blood urea curve shows rapid drop from 250 mgm. to 40 in 5 days.
Phthalein curves show improvement, along with the drop in blood urea, with the shortening of appearance time and the moving of the apex of the curve from the second to the first half hour.

XUM

gard to a new urological diagnostic procedure which has been heralded recently throughout the medical world. We speak of intravenous urography. We had the good fortune of being with Professor Von Lichtenberg, in Berlin, three years ago when he was applying this test clinically for the first time. He does not claim that it is a good test of renal function, but rather discourages its use as such. However, there are cases when undoubtedly it does give us some index of the excretory function of the kidneys. But it is not accurate or delicate enough to supplant our present tests. For instance, we must take into consideration the anatomical and pathological condition of the whole urinary tract before one may draw conclusions. If there is obstruction present anywhere along the path, the accumulated iodide will cast an intensified shadow. A kidney with poor function plus obstruction to that side in the hour plate may give as good a picture as a good unobstructed kidney. One must, of course, take into consideration also the relative appearance times of the shadows, etc. There are, however, cases undoubtedly where gross differences are noted in the shadows of the two kidneys when this will be a distinct aid in deciding the diseased organ or where we can obtain a rough idea of the functional capacity of the kidneys.

This is shown rather plainly in the three urograms which are inserted. Urogram No. 1 is of a normal individual showing both kidney pelves filled with Skiodan five minutes after injection. This shows shadows of normal intensity of the kidneys, ureters and bladder. Since the Skiodan has gone through with this much intensity in five minutes, one would gather that both kidneys have very good function. Urogram No. 2 is of a boy with sus-

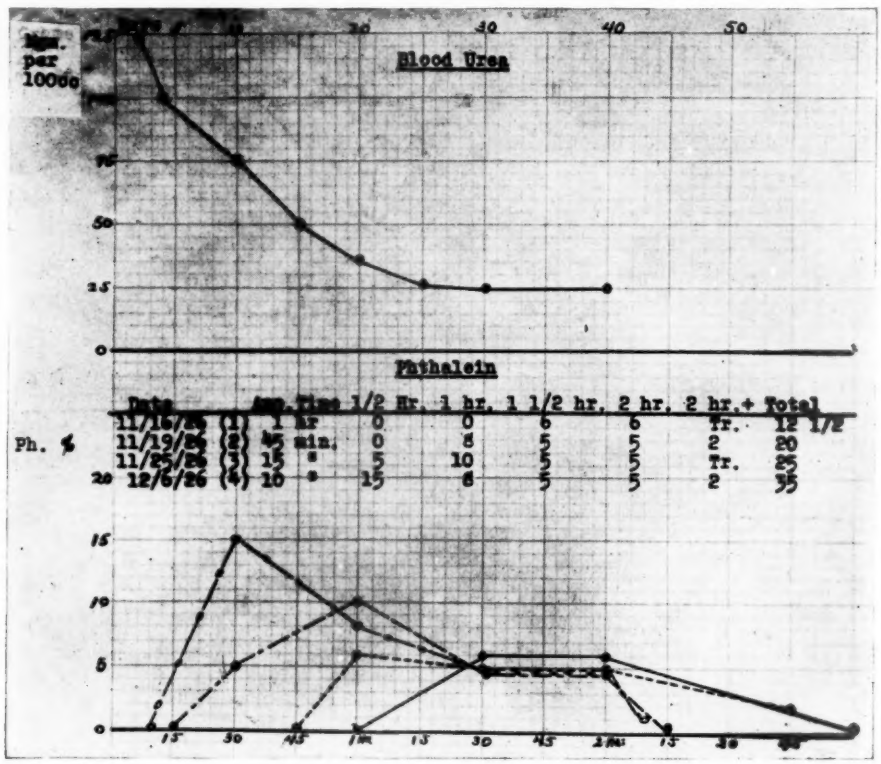
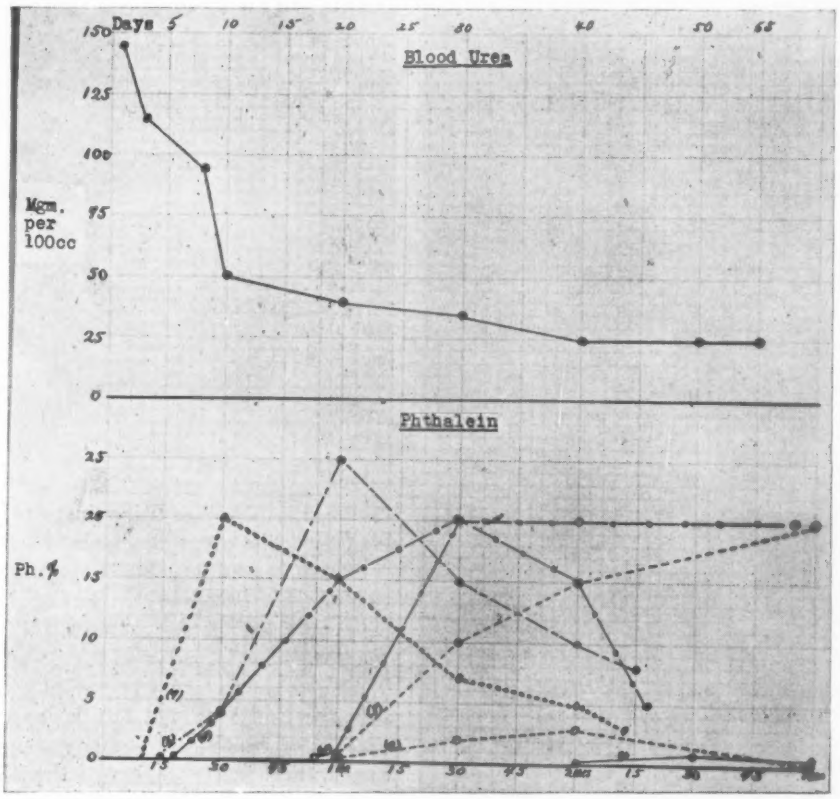


Chart 11.—Blood urea and phthalein curves of a patient with urinary obstruction. Blood urea curve shows gradual drop from 125 mgm. to 25 mgm. in 25 days, and then remaining at this level. Phthalein curves show very poor excretion in the first curve and gradual improvement through curves 2, 3, and 4, with the appearance time shortening from one hour to 10 minutes, and with no excretion in the first hour in the first curve to 15 per cent the first half hour in the fourth curve. Note also that in the last three curves there is only a difference of 15 per cent in their total two-hour collections, but when these collections are charted every half hour one sees readily the marked improvement in the patient's renal function.

pected tuberculosis of the right kidney. This picture, taken five minutes after injection, shows the left kidney pelvis well filled and the shadow of normal intensity, while, on the right side, the kidney pelvis is very indefinitely seen and of not nearly the intensity shown on the left. One would gather that the function, therefore, of the right was not as good as that of the left. This was checked by a differential phthalein test and the appearance time was four minutes on the left, with 20 per cent the first fifteen minutes, and six minutes on the right with 6 per cent the first fifteen minutes. Urogram No. 3 is one of a patient with left-sided renal symptoms in whom it was impossible to catheterize the left



DATE	Approximate Time, Minutes	½ Hour	1 Hour	1½ Hours	2 Hours	2+ Hours	Total
10/ 5/28 (1)	2 hours	0	0	0	Trace	Trace	Trace
10/10/28 (2)	1 hour	0	0	2	3	0	5
10/17/28 (3)	1 hour	0	0	10	15	20	45
10/26/28 (4)	50	0	Trace	20	20	20	60
11/15/28 (5)	17	4	15	20	15	5	59
11/28/28 (6)	15	4	25	15	10	8	62
1/12/29 (7)	10	20	15	7	5	3	50

Chart 12.—Curves of patient with urinary obstruction showing very marked improvement in suprapubic drainage. Blood urea curve shows a rapid drop from 150 mgm. to 50 in 10 days, and then from 50 mgm. to 25 mgm. in 30 days.

Phthalein curves show very remarkable improvement from curve 1, which is a flat line, with an appearance time of 2 hours, through curves 2, 3, 4, 5, and 6, the appearance time moving from 2 hours down to 15 minutes, and the apex of the curve slowly moving from 2½ hours in curve 1 to 1 hour in curve 6. Then, following operation, we have the best curve of them all, curve 7, with appearance time of 10 minutes and 20 per cent in the first half hour. The totals have increased from practically 0 to 62 per cent in 2 hours. Following the removal of the obstruction, the curve approximates much more nearly the normal, with the greatest excretion in the first half hour, even though the total excretion in 2 hours is slightly less than in the preceding curve 6.

Urogram 1.

Urogram 3.

Urogram 2.

ureter, the blockage being just outside of the bladder. The urogram shown is a fifteen-minute plate and, as is quite plainly seen, the Skiodan has been secreted in the right kidney in abundance, giving a beautiful shadow of the renal pelvis, calyces, ureter and bladder. This is evidently an hypertrophy to compensate for the destroyed left kidney, the large shadow of which can be easily seen with some calcification in the region of the renal pelvis. There is no evident function in the left kidney. These three urograms show what we mean when we say that intravenous urography can give a rough idea of the comparative function of one kidney with the other.

In the consideration of this whole subject, one must never forget that in the practice of medicine the results of these tests and the information gained from direct observation of the patient should all fit together into a logical and intelligent understanding of the individual's renal capacity.

Duke Hospital.

GRAIN ITCH—REPORT OF TWO CASES OCCURRING IN A SMALL EPIDEMIC.*

HERMAN E. KITTREDGE, M. D., Washington, D. C.

Dermatologist to Saint Elizabeth's Hospital; Dermatologist to Providence Hospital; Associate Dermatologist to the Central Dispensary and Emergency Hospital.

The purpose of this paper is to invite the attention of general practitioners, particularly in agricultural communities, to a distressing cutaneous malady which, although well known to the dermatologist, is probably unfamiliar to the majority of the profession.

Definition.—Grain itch is an acute inflammatory disease of the skin, caused by the Pediculoides ventricosus, and characterized by an eruption of pinkish-red erythemato-papular or erythemato-urticarioid lesions topped by a central vesicle, occurring principally on the trunk, and attended with violent and persistent itching.

Synonyms.—A few of the many synonyms of the disease, giving as they do a clue to its etiology, are of interest here: Grain mite dermatitis, barley itch (Wills), straw itch (Rawles), straw mattress disease, straw-packers' itch, etc. The less definite designations of prairie itch, swamp itch, Ohio scratches, etc., often point, in the opinion of Stelwagon and Gaskill,[1] to the same etiologic factor.

Symptoms.—The characteristic lesion of the eruption, according to Schamberg,[2] is an urticarioid wheal surmounted by a tiny central vesicle that rapidly becomes lactescent or even puriform. The vesicles vary in diameter from that of a pin-point to that of a BB shot (0.5 to 2 mm.). When of the larger size, if the skin between the wheals be not too erythematous, the cutaneous picture may strikingly resemble that of chicken-pox. In many cases, however, the efflorescence is erythemato-papular or erythemato-urticarioid, with here and there characteristic central vesicles. The latter may be replaced by blood-crusts, or by excoriations, due to scratching. The lesions range in size from that of a lentil to that of a finger-nail, and are rounded, oval or irregular in outline. Their color is a rather vivid pinkish red, like that of the papules in early scabies. The distribution of the eruption varies; but the neck and the trunk, and, to a lesser extent, the arms and the legs, are usually involved. The face may show a few lesions; but the hands and the feet are ordinarily exempt.

Among the subjective symptoms, itching is invariably violent, if not intolerable, and is, as in scabies, worse at night, making sleep difficult or impossible. Malaise, anorexia, nausea, vomiting, chilliness, and rise of temperature also may be experienced.

Etiology.—As early as 1829 an itching eruption in persons who had slept in barley-straw beds was observed in Massachusetts.[3] In 1849, Lagreze-Fossat and Montane, in France, noted the affection and the "Acarus tritici" in association with it. In 1853, Newport, in England, gave to a mite that he discovered in 1849, on the larvae of a wasp, the name Heteropus ventricosus; but as the genus "Heteropus" was preoccupied, Targioni-Toizzetti, in 1875, substituted the generic name "Pediculoides." In France, Robin, in 1867, and in Hungary, Geber, in 1879, and Koller, in 1882, as well as other Europeans, about the same time or soon after, published observations on the mite and the affection that it causes. Although the presence of the Pediculoides ventricosus in this country was noted by Webster in 1882, it was not until 1901, when Schamberg[4] contributed his first paper, that the disease which the pediculoides produces was clinically described in the United States. In that paper, no parasite was assigned the etiologic rôle. But on July 9, 1909, fifty-six years after Newport's apparently erroneous naming of the pediculoides, Schamberg and Goldberger[5] announced the results of a joint investigation demonstrating that the affection was caused by a mite that Banks, of the Bureau of Entomology, stated "is very close to, if not identical with, Pediculoides ventricosus." Only six weeks later (August 15th) Rawles[6] published a description of a cutaneous disease that he termed "Dermatitis Ditropinotus Aureoviridis," or straw itch. It presented the identical clinical symptoms noted by Schamberg. But Rawles proved that it was caused by a parasite that Mr. James Troop, entomologist, had identified as Ditropinotus aureoviridis, "a new species of parasite, it having been described last year [1908] for the first time." In 1910, Schamberg,[7] amplifying his previous work, and reviewing the literature of the subject, stated that the disease and the associated parasite described by Rawles are identical with those described by himself. Since then the Pediculoides ventricosus has been accepted by dermatologists as the cause of the affection. The mite is parasitic on the

*From the Dermatologic Service of Dr. Herman E. Kittredge, St. Elizabeth's Hospital.

wheat strawworm, the jointworm, the grain moth and many other insects.

Diagnosis.—Scabies, pediculosis corporis, varicella, and urticaria must be excluded. Scabies is excluded by absence of burrows, by lack of involvement of the hands, by involvement of the face in adults, by pronounced invasion of the interscapular region, by erythemato-urticarioid lesions surmounted by vesicles, by constitutional symptoms, and by failure to find the Acarus scabiei upon microscopic examination. Pediculosis corporis is excluded by absence of the characteristic hemorrhagic spots, by absence of parallel linear scratch-marks radiating upward and outward from points on the upper back, and by absence of the pediculus and its ova. Varicella is excluded by comparatively long duration of lesions, by the smallness of the vesicles capping elevated papules or wheals, by violent and persistent itching, and by high incidence in adults. Urticaria (including urticaria bullosa) is excluded by lack of evanescence in lesions, by the largest of the surmounting central vesicles being less than three-sixteenths of an inch (5 mm.) in diameter, by absence of constitutional symptoms, and by multiplicity of cases in a family or other group. A history of contact with grain or straw is of diagnostic import.

Treatment.—This will be indicated in the following:

Report of Cases

History.—On June 8, 1933, the physician in charge of the general medical and surgical division of St. Elizabeth's Hospital requested me, by telephone, to see two employees who had been itching since working in a barn three days before, and whom he was sending to my office. The words "barn" and "itching" suggested that I was to witness some of the master handiwork of the little pediculoides; and even a casual personal inspection, made a few minutes later, was sufficient to convince me that I had not been disappointed. L. G. and N. R. B., males, white, aged 63 and

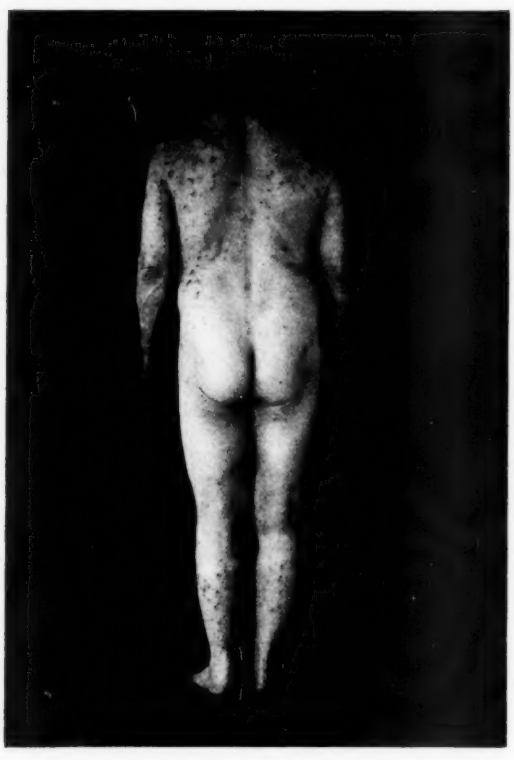


Fig. 1 (L. G.).—Photograph taken on third day, showing distribution of eruption on posterior aspect of trunk, arms, and legs.

Fig. 2 (L. G.).—Photograph taken on third day, showing erythemato-papular and erythemato-urticarioid lesions, with surmounting central vesicles excoriated, on anterior surfaces of legs.

31, respectively, carpenters, had been directed, three days previously, to visit a barn that is located about four miles distant, in Maryland, for the purpose of making interior repairs. For a number of years, it had been the practice to stow, upon a hay-mow in the barn, baled wheat straw grown on the farm belonging to the hospital. There was no appreciable amount of the straw itself on the hay-mow at the time; but there was an accumulation of fragments, chaff, and dust, from the straw. The two men, L. G. in particular, stood and sat upon the mow during the course of their work. When they entered the barn, in the morning, they were free from any cutaneous affection; but before they left the building, about four o'clock in the afternoon, they had begun to itch.

Examination.—Three days later, when first examined by me, one of them (L. G., Figures 1, 2, and 3) showed an acute inflammatory eruption, erythemato-papular and erythemato-urticarioid in type, involving the larger part of the trunk, the arms, and the legs. A tiny central vesicle or pustule topped many of the lesions. In the other case (N. R. B., Figure 4), the eruption was less general; but a broad band, or collar, of the lesions completely encircled the neck. In both cases, the face, the hands, and the feet were free. The itching was violent, entirely preventing sleep in the case of L. G. This patient developed constitutional symptoms, including a definite rigor.

Fig. 3 (L. G.).—Photograph taken on third day, showing erythemato-papular and erythemato-urticarioid lesions, surmounted by central vesicles or pustules, on posterior surfaces of trunk and left arm.

Diagnosis.—Scabies, pediculosis corporis, varicella, and urticaria being definitely excluded by the history and the symptoms, the diagnosis of grain itch was made, without looking for the pediculoides.

Treatment and Results.—For the acute stage, Schamberg's ointment was prescribed—Rx Betanaphtholis, 2.00 gm., Sulph. praecip., 2.60 gm., Adipis Benzoat., 30.00 gm. M. This was applied practically as are similar ointments in the treatment of scabies. After four days, soothing lotions were used. One of the patients (N. R. B.) was entirely well, and in the other (L. G.) the eruption had almost completely involuted, twelve days after instituting treatment.

Further Incidence.—Six additional cases developed and were treated by other physicians connected with the institution.

Fig. 4 (N. R. B.).—Photograph taken on third day, showing erythemato-papular and erythemato-urticarioid lesions, surmounted by central vesicles or pustules, on posterior surfaces of neck and left shoulder.

Two other cases of grain itch, occurring in husband and wife, in a wheat-growing section of Fairfax County, Virginia, came under my notice in September, 1925.

Summary

Two cases of grain itch, occurring in an epidemic of eight cases caused by contact with debris from infected wheat straw, are reported.

Comment

As the disease is liable to be encountered

anywhere in agricultural sections of the Eastern United States between May and October, it should be of particular interest at this time to physicians in rural communities.

BIBLIOGRAPHY

1. Stelwagon, Henry W., and Gaskill, Henry Kennedy: A Treatise on Diseases of the Skin, ed. 9, Philadelphia, W. B. Saunders Company, 1923, pp. 990, 1242 (footnote), 1243 (footnote).
2. (a) Schamberg, Jay Frank: Grain Itch (Acarodermatitis Urticarioides): A Study of a New Disease in this Country, *J. Cutan. Dis.*, 28:67 (February) 1910; (b) Diseases of the Skin and the Eruptive Fevers, ed. 3, Philadelphia, W. B. Saunders Company, 1917, p. 206.
3. For historic and etiologic bibliography from which most of these facts were taken, see Schamberg (footnote 2 (a)); Stelwagon and Gaskill (footnote 1) pp. 1242 (footnote), 1243 (footnote)); and Webster, F. M.: A Predacious and Supposedly Beneficial Mite, Pediculoides, Becomes Noxious to Man, *Ann. Ent. Soc. Amer.*, 3, No. 1, 15-39, 1910.
4. Schamberg, Jay Frank: An Epidemic of a Peculiar and Unfamiliar Disease of the Skin, *Phila. Med. J.*, 8:5-6 (July 6), 1901.
5. Schamberg, Jay Frank, and Goldberger, Joseph: Epidemic of an Urticarioid Dermatitis Due to a Small Mite (Pediculoides Ventricosus) in the Straw of Mattresses, *Public Health Reports*, 24: pt. 2, No. 28 (July-December), 1909.
6. Rawles, Lyman T.: (a) Dermatitis Ditropinotus Aureoviridis; Synonym, Straw Itch, *Ind. State Med. J.*, 2:337 (August 15), 1909; (b) Dermatitis Pediculoides Ventricosus; Synonym, Grain Itch, *Ibid.*, 3:351-354, 1910.
7. Schamberg (footnote 2 (a)).

412 *Columbia Medical Building.*

THE PROGNOSTIC VALUE OF THE ELECTROCARDIOGRAM.*

JAMES W. HUNTER, JR., M. A., M. D., F. A. C. P.,
Norfolk, Va.

The recent sudden death of a very prominent and lovable Presbyterian clergyman in the office of a professional man in the city of Norfolk and the more recent sudden passing of a former president of the United States at his home in a Massachusetts city serve in no small way to call our attention to the growing significance of heart disease. According to the papers the minister, who considered himself in excellent health, was suddenly seized with a violent pain. He sought the office of the professional man and expired in a few minutes. The cause of death as reported was angina pectoris. The body of the former president of the United States was found lying upon the floor of his dressing room, where he had retreated for the purpose of shaving. But the significant part of both of these stories is that the patients belonged to the white race and were educated men. One hardly expects, however, the relatively tranquil life as led by a minister of the gospel to bring into being such troubles as high blood pressure, cerebral hemorrhage or coronary occlusion, though we must confess that none but the hardiest individuals can survive the pressure of the presidency as it is now conducted. Nor is this all. It is only necessary to recall that our own profession in Norfolk has lost nine of its prominent members in little over a year. One had reached the age of seventy-six; two died at sixty-seven; five passed away at ages varying from fifty-eight to sixty-one; one left us at fifty. Of these nine three died of coronary disease. So that we may well repeat that the increasing death-rate from heart disease among the educated members of the white race presents indeed a problem.

My own experience in the domain of heart disease has been full and ample. I have seen much that is usually denied to others. But it is especially the element of sudden death due to grave coronary and myocardial disease that has aroused me most. As a very young man the sudden death of the mother of one of my old college mates supposedly after an attack of indigestion; as a young practitioner the sudden passing at a railroad station in a North Carolina city of an old friend, who had been more than a professional father; and, in my days of general practice the sudden expiration of a patient, a lady in the late fifties (who had suffered with pain in the lower left chest and had carried for many months both strychnine and nitroglycerin tables in her bag) on the porch of a residence, where she had stopped during a walk on a Sunday afternoon,—these have contributed in no small measure to my interest in the problem of sudden death. With the invention of the many instruments of precision that are used in the examination of the heart this field has become more than fascinating. I have had the opportunity of seeing in consultation many patients, who have died suddenly. Of the three medical men, of whom we spoke above, and whom we have lost only recently from heart disease, one had an attack in my office some years ago, one was referred to me for an electrocardiographic examination as a part of a general survey, one became alarmed at an increase of blood pressure accompanied by malaise and

*Read before the Norfolk County Medical Society, Norfolk, Va., January 16, 1933.

weakness. And so, apart from the many opportunities that I have had through the courtesy of instructors and friends, I feel qualified by experience at least for preparing the paper, which I now present.

The advent of a special interest in cardiology is most interesting. As a student of medicine in the late nineties and early hundreds I learned that the diagnosis of heart lesions was to be made solely upon the history and physical findings. It was indeed an era of theory and guess work. The correlation of clinical observation and post-mortem findings was denied to all but the favored few. But, even then, to paraphrase a famous clinician, "signs would sometimes lie." With the advent of the instruments of precision, such as the sphygmomanometer, the determination of the basal metabolic rate and the roentgen rays, many of the older mistakes were corrected; but much of the educated touch and clinical observation was lost. The internist, so to speak, became a sort of medical clearing house. Fortunately, the pendulum has now swung to the middle of the arc. The clinician must now use his own powers of observation and, if possible, combine them with his own use of the instruments of precision. The modern cardiologist is prepared to use all methods that will aid him in the study of the case.

He has, accordingly, felt that there is a certain something behind the clinical, physical and laboratory findings that he must know. He must, if possible, learn something of the internal working of the heart. The correlation of the feel of the radial pulse and of the observation of the pulsation of the veins of the neck was not sufficient for Mackenzie and so he invented the polygraph, whereby simultaneous tracings could be made of the arterial and venous pulses. A little later Einthoven, finding that an electrical current was generated at every heart beat, devised his electrocardiograph, whereby these electrical impulses are translated into a tracing and duly recorded. The resulting electrocardiogram is much simpler of interpretation than the polygram of Mackenzie and, while much study has been given and must still be given, so much has been learned that in most cases he who runs may read.

The use of the electrocardiogram is primarily one dealing with diagnosis. The division of the heart beat is such that the time, strength and quality of both auricular and ventricular beats together with their sequence is determined and recorded. It becomes, therefore, the great instrument in diagnosing the arrhythmias, such as the comparatively benign sinus arrhythmia and extrasystole, the annoying tachycardias, auricular fibrillation and auricular flutter and the alarming heart block, pulsus alternans and ventricular fibrillation. Nor is this all. The tracing is a direct indication of the character of the musculature of the heart. The relation of the iso-electric line, the quality and duration of the ventricular beat and the character of the ventricular rebound, or T-wave, will determine most unerringly in most instances the present or absence of myocardial weakness or of muscular degeneration. I might continue almost indefinitely. But, as the various arrhythmias rarely kill a patient *per se*, it will be necessary to limit our discussion to those diseases, which, as we have said above, are attended by a sudden exodus. The electrocardiogram will aid us in the diagnosis of coronary disease, heart block and pulsus alternans. If we would know of the prognostic use of the electrocardiogram, let us first learn of its diagnostic value.

The various pains occurring in the chest are likely to give the examiner much trouble and uneasiness. The precordial aching, so characteristic of neuro-circulatory asthenia, or effort syndrome, the paroxysmal substernal oppression, especially if accompanied by pain on the inner side of the left arm, as in angina pectoris, and the excruciating pain accompanying a coronary occlusion,—these indeed present a diagnostic problem. If only those pains occurred in actual practice as the writers of our textbooks present them, the differential diagnosis would be an easy one. But not so. These cases command our attention and our best and most painstaking efforts.

In my own experience the diagnosis of neurocirculatory asthenia has been comparatively easy. A sudden collapse after some form of effort in a young or middle-aged patient, acpanied by the symptoms of shock together with pain in the chest and a pounding of the heart, these present a very clear and definite problem. After recovery it will be observed that the physical, laboratory and electrocardiographic examinations are negative. But it will also be observed that the effort causing the symptoms is usually of a disagreeable

XUM

nature, while an equal or even greater effort of a pleasurable type will cause no such reaction. My last case was that of a professional embalmer, aged 28, who as a sergeant attended one of our military camps. His occupation while at camp was that of a chauffeur and was not especially pleasurable. He collapsed and caused the camp surgeon much alarm; likewise, after two recent embalmings. But, upon close questioning, he admitted that exercise or nervous tension likely to afford him a certain amount of pleasure brought no such reaction. The physical examination, the roentgen examination and the electrocardiographic examination are all negative. The blood pressure is a little low. I might also mention the case of Miss X., aged about 60, a school teacher by profession. She suffers with a tachycardia and some pain, mostly in the upper left chest. She has never had any very severe attacks, continues her vocation and looks well. She has, however, been told that she has a myocarditis. Her physical, roentgen and electrocardiographic examinations are negative save for the slight tachycardia. But no amount of argument or of examinations by cardiologists other than myself will convince her that a myocarditis does not exist. In like manner, the Reverend Y., aged 60, has occasional spells and has been told that he suffers with angina pectoris. The character of the pain, however, is not typical. He has had considerable difficulties with various congregations, but drives his car for long distances and appears well. The electrocardiographic examination is again negative. And so I believe that, though we are often inclined to diagnose many cases as angina pectoris, those presenting angioid symptoms, especially attending some form of mental or physical exercise of a disagreeable character but not after pleasurable exercise, must be diagnosed regardless of the age as neuro-circulatory asthenia. A certain amount of self-hypnosis can often be observed.

But no such history attends a case of angina pectoris. Let us take the case of a severe substernal pain occurring in an elderly man or woman and radiating down the arm, usually the left one, where the question of effort seems to play but a small part, especially as to whether the effort is of a disagreeable or pleasurable character. Such a patient has to stop at once and the question arises as to whether any exercise shall be allowed or only such an amount of exercise as will not cause an attack of pain. The diagnosis is usually unmistakable, especially when there is a history of the thought of impending death (though it is usually agreed that such a history is not necessary for diagnosis) or when prompt relief has been afforded by the use of the nitrites. It is further to be observed that these cases belong to the white race and usually occur among the educated classes. Here, again, physical examination is negative, the roentgen examination is likewise negative, and the electrocardiographic examination is also negative.

We now come to a third type of pain, viz., that associated with coronary occlusion, "perhaps," to quote White, "the worst pain that can be experienced by man." The classical case is easily diagnosed—a severe pain in the epigastrium or lower left chest often accompanied by pain radiating down the left arm, no relief from the nitrites, a pain persisting and readily recurring. Of this I have seen many cases. Some authorities seem to consider coronary occlusion as an advanced state of angina pectoris, and would so classify it; for in some way the clinical symptoms seem to intermingle. But, again, a large number of cases suffering from the lesion of coronary occlusion experience little or no pain; they persuade themselves that they are suffering with some form of indigestion. If we will recall the case of the Presbyterian clergyman, whom we have mentioned above, he informed the professional man, to whose office he had retreated, that he was suffering from indigestion caused by some apples eaten the night before. The former president of the United States we are told was also wont to suffer from indigestion. I would, however, call the attention of those clinicians, who consider this entity as a late stage of angina pectoris, to the fact that coronary occlusion is not the exclusive property of the white race. I have seen it in a negro male.

Unlike neuro-circulatory asthenia and angina pectoris, coronary occlusion is accompanied by typical changes in the electrocardiogram. The changes occurring in the T-wave are eminently diagnostic. This T-wave is reversed in one or more of the leads and is usually accompanied by a peculiar deflection at the beginning, known as a Pardee's sign. If this inverted T occurs in the first lead or in both the first and second leads, we usually associate it with a lesion in the left coronary

artery; if in the second and third leads, with the right. An inverted T in the third lead is usually considered of no importance. Recently, however, this inverted T in the third lead, if accompanied by a large Q-wave, has been considered also as an indication of a coronary lesion, though there are some who seem to feel that a septal defect should be suspected. More recently Wolfert and Wood have described a chest lead and have felt that a change in the iso-electric line in this lead was indicative of coronary disease. But, be all these interpretations as they may, the definite changes in the electrocardiographic tracing are usually diagnostic. If not definitely diagnostic, they should call for a further study of the case.

It will not be out of place to compare the clinical with the electrocardiographic prognosis in the cases of both angina pectoris and coronary occlusion. We shall compare the best available statistics. Thus White and Bland have furnished us with a clinical study of five hundred cases of angina pectoris and two hundred cases of coronary thrombosis. "Of the five hundred cases of angina pectoris two hundred and thirteen are dead with an average duration of life of 4.4 years after the onset of the disease. The average duration of life to date for the total series of five hundred cases is 4.9 years. Of the patients who died, death could be attributed to failure of the heart in 82 per cent, and a sudden exodus was frequently encountered. About one-fifth (19 per cent) had normal hearts on physical examination, normal blood pressures and normal electrocardiograms. * * * Of the series of two hundred cases with coronary thrombosis, one hundred and one are dead with an average duration of life following the attack of 1.5 years. The average duration to date for the entire series of two hundred patients is 2.4 years. The patients who died almost invariably succumbed to failure of the heart." On the other hand, Carter has quoted the statistics of Willius, which are based entirely on the use of the electrocardiogram. A recapitulation shows that of 883 cases showing an inverted T in lead I from whatever cause, 535 (60 per cent) died in less than nineteen months; of 397 cases showing an inverted T in both the first and second leads, 241 (60 per cent) died in less than thirteen months; of 211 cases showing negative T's in all three leads, 141 (66 per cent) died within seventeen months; and of 259 cases showing a negative T in both the second and third leads, 120 (46 per cent) died within less than twenty-four months.

As we have stated above, the various arrhythmias rarely cause death *per se*, yet it is important to note them. Of these an auriculoventricular heart block (especially a complete one) should give us full warning that, unless something favorable happens to the patient, death may be expected. Particularly is this true in Adams-Stokes disease. Unfortunately, however, no statistics are at hand. Then, too, as we have said above, the character of the ventricular beat, or QRS complex of the electrocardiogram, must be studied, its strength, width, slurring, etc. For it is upon these that diagnoses of myocarditis, adhesions and bundle branch block lesions are made. I would also call your especial attention to the question of pulsus alternans. While perhaps an auscultatory gap in the examination for blood pressure would make the examiner suspect the lesion, or it is better delineated in the pulse tracing, still in the great majority of cases the electrocardiogram is more than diagnostic. In my own experience the variation of alternations in the height of the ventricular contraction is best shown in the third lead. Recently I saw in consultation a lady, aged 54, whose tracing showed an accent upon every third beat. Grave myocardial disease was, of course, recognized; but we were not prepared for a sudden exodus a year later.

This discussion, though far from adequate, should serve in some way to show the interest that must be taken in the electrocardiogram, for the tracing has passed the days of being merely of an academic interest; its clinical meaning must be recognized. It will serve to differentiate and explain the various arrhythmias; it will serve to differentiate between and diagnose the exceedingly grave diseases known respectively as angina pectoris and coronary occlusion. It will inform us of the state of the myocardium. It will prognose in no uncertain way an approaching exodus. And so, if we would be true to both our patients and ourselves, an electrocardiographic examination should be made in every doubtful case. The intelligent study of any disease or of any patient requires the use of all of the available facts. This is especially true of heart disease. The educated touch and trained ear

no longer suffice. Like Lord Bacon, we must take all knowledge as our province. For, as we have said above, the problem of heart disease, especially among the educated members of the white race, is indeed a problem.

My thanks are due to Dr. H. S. Baker, Dr. John Beattie, Dr. L. L. Eley, Dr. M. S. Fitchett, Dr. E. T. Glover, Dr. C. L. Harrell, Dr. A. B. Hodges, Dr. Eugene Lowenberg, Dr. Walter B. Martin, Dr. Robert L. Payne, Dr. Frank H. Redwood, Dr. N. F. Rodman, Dr. George Schenck, Dr. C. C. Smith, Dr. J. Warren White, Dr. L. W. White, Dr. R. C. Whitehead, Dr. N. G. Wilson and many others, who have referred their patients to me for examination and study. Without their kindly cooperation this paper could not have been written.

REFERENCES

Carter, J. B.: *Jour. A. M. A.*, October 29, 1932.
Edeiken, Joseph, and Wolfert. C. C.: *American Heart Journal*, August, 1932.
Lewis, Sir Thomas: The Mechanism and Graphic Registration of the Heart Beat, third edition. London, 1925.
Mackenzie, Sir James: Diseases of the Heart, Oxford, 1925.
Pardee, H. E. B.: Clinical Aspects of the Electrocardiogram, New York, 1924.
White, Paul D.: Heart Disease, New York, 1931.
White, P. D., and Bland, E. F.: *American Heart Journal*, October, 1931.
Willius, F. A.: Electrocardiograms, Philadelphia, 1927.
Wolfert, C. C., and Wood, F. C.: *American Heart Journal*, January, 1932.

Medical Arts Building.

THE SURVIVAL OF THE FAMILY DOCTOR.*

ROY K. FLANNAGAN, M. D., Richmond, Va.

Assistant Commissioner Virginia State Health Department.

AN UNFORTUNATE TENDENCY. — In these times, which, to the oldsters among us at least, appear abnormal, certain tendencies seemingly directed towards a complete overturn of many institutions of the old order are finding a degree of acquiescence from a large section of the public that, to thoughtful men, is of sinister significance and bears implications most destructive to much that is best in our civilization.

Among these tendencies is the disposition to consider the family physician an obsolete institution. There are few of us who have not at times yielded to the discouraging drift and deplored what seemed the inevitable disappearance of the old time family doctor. This tendency should not be allowed to become chronic. I wish, therefore, at this time to sound an entirely different note, for thoughtful consideration of the whole subject has led me to the conclusion that there is no occasion whatsoever for despair.

ESSENTIAL SERVICE.—The family doctor, with all that title implies, is needed more than ever, and if the medical profession is to survive independent of State subsidy—if, in other words, some form of State medicine is not to swallow up an institution which has served as a sheet anchor to the American home,—then something more than talk and protests against public health activities—National, State or local—will have to be done. A resort to organization and unified action will not in itself serve to stem the tide for long, though close organization is essential in any event. (In a paper before the Medical Society of Virginia at Roanoke in 1909 I emphasized this point—"Duty of the Doctor to his Municipality," *Charlotte Medical Journal*, November, 1909.)

The doctor in politics—and he ought for other than personal reasons to be there in larger numbers than now—will always be more or less of a fish out of water, for he cannot, if he be the right kind of a doctor, compete very successfully with commercialism in politics any more than he can compete with it in medicine.

UNDESIRABLE TERMS.—He need, therefore, not expect a complete remedy for his ills, social and financial, through such channels. In such case, to save himself would be to lose the very quality that makes him in the highest degree worth saving. Salvation on these terms, if it were possible for him to achieve it, would simply mean freedom from competition, except such competitors as he, from the limited viewpoint of curative practice, judged to be friendly to him. The stimulus of intelligent competition is needed to prevent rusting. Pure self-interest exhibited by the doctors is, if anything, a more unlovely trait than it is in any other self seeker. As I see it, an essential element in every true physician is disinterested humanitarianism. In the eyes of the public, as soon as the doctor parts with this quality, he loses caste and stands on all fours with the pettifogger and the quack, and a noble art is debased to the status of money grubbing commercialism. The inconsistent public, though itself commercially-minded, always looks for something higher in its doctor, and

*Read before a joint meeting of the Albemarle and Piedmont Medical Societies at the University of Virginia, December 8, 1932.

usually finds it. The physician is now caught between his idealistic standards and his dire necessities. Is it any wonder that many bewildered doctors, seeing certain forms of sickness disappearing, and the ability to meet the costs of decent living daily becoming more difficult, prophesy loudly the rapid disappearance of the family doctor?

Test of Time.—This attitude to my mind is unphilosophic, for an institution that has stood the test of time as the family doctor has, an institution that has lost no valuable quality that it ever had, but, on the contrary, year by year in its true expression has demonstrated increased capacity for essential service to humankind, should not die, and I am persuaded will not die unless it is done to death by disintegrating influences operating from within the ranks of medicine itself. If such influences are at work, and this appears to be the case, words will not banish them. The application of modern methods only can combat the ill effects to the doctor consequent upon the changes which have come.

Stagnant Talent.—Medicine, while enjoying and revelling in the appellation "learned profession," is not composed of uniformly learned and progressive men. Doubtless the average is high, but too many doctors neglect to use their opportunity to keep pace with advances in the most rapidly growing profession of them all. The result is too often medical stagnation in some back water, while the stream of modern life moves on. If the general practitioner does not call in a specialist for his well informed patient, when quick response to his own treatment is not forthcoming, the patient will go elsewhere of his own accord, and thereafter be his patron no more. The people who can afford it wish the best service possible and usually know where to look for it.

For every physician to do his own major surgery, his own ophthalmology and otology, his own orthopedics, and his own X-ray work is neither practicable nor desirable, but the aspects of his profession for which he has qualified, and which by application and study he can and should keep fresh upon, and which constitute nine-tenths of all the medical work in his vicinity, should be his to handle, and to him should go all the credit and cash that legitimately inheres thereto. I firmly believe that few general practitioners of medicine, however busy they may be, are doing a tithe of the medical work that should be done in the homes of those who normally look to them for medical advice. The alert doctor knows this, but how to meet the situation is not so clear to him.

This is no occasion for censure, but it does call for a thoughtful and sympathetic consideration of all practicable and honorable means proposed for the preservation of the family physician intact.

Completely Useful.—Compassing the full medical job in any given community apparently involves "digging up" medical business, and the doctor conceives this to be an unethical proceeding. All traditions of the profession are against it. I submit, however, as a matter of straight morality entirely apart from medical polity, that the ethics of the patent medicine man, who with all the arts of "'bally hoo" calls attention to the need for relief from some common ill to which flesh is heir, and suggests a remedy—however futile,—are in essence higher than those of the man who alone has knowledge of a man, woman, or child in mortal danger from a deadly malady and yet says no word of warning or fails to use facilities available to him to make that danger plain. A conception of ethics, medical or otherwise, that hinders anyone pointing out the danger in such circumstances has no place in any humanitarian scheme. Like many aspects of orthodox religion, adherence to old interpretations of the letter of the law has obscured the spirit with the same result, the family doctor's offices, like the churches, are slowly emptying.

Taking Stock.—My thought is that, if the general practitioner in city, town, and country will closely examine some of his cherished "ethical" viewpoints, he will not only find that they have no sanction by any true ethical standard but that they negative many fundamental tenets on which his profession has relied for its high standing before the world. Take, for instance, the two infectious diseases contributing more largely than any others to the death rate, namely, syphilis and tuberculosis. The doctor sees these cases before any one else. He knows, as the patient cannot know, their acute contagiousness and their death dealing character. He knows that these diseases take heavy toll of the future, and that children carry the heaviest burden from them both. He is unfortunately also acutely aware of the association of these diseases with poverty and poor pay. He hesitates under the ethical code, as

XUM

he interprets it, to do anything towards "drumming up trade," so he is slow to suggest that other members of the patient's family will from the moment of diagnosis of that patient's disease need more or less constant attention from a physician. I know some of you will say that I am setting up a straw man, and that many physicians do go into detail about these matters regardless of the patient's reactions. I am happy to say that I know such to be the fact—many do, but more do not,—and I also know that the increase in the incidence and in deaths and disabilities from syphilis throughout the land, and the slow, very slow reduction comparatively, of the tuberculosis death rate speaks in trumpet tones that the knowledge of which the medical profession alone is custodian is not being made available where it can be advantageously used to prevent the widespread infection of unsuspecting people and the deaths of many children.

The Best Way.—I say advantageously used advisedly. Hitherto when I have used this expression in this connection, I have thought in terms of health department use of this information. I have come to believe that, however important it may be, and it is highly important for the health authorities to have early information of the deadly infectious diseases such as syphilis and tuberculosis within their jurisdiction, it is yet more mportant that the doctor who sees a case of either of these diseases shall act on his knowledge at once and see that they extend no further than that case. This involves more than treatment of the sick individual and warning and advice for the protection of the home, and it involves more than making a report and "passing the buck" to the health department, though such report will bring him aid and support in his efforts. In my judgment, to do a complete job, the proper action of the physician in such a case means the seizure by him of the strategic point in medical practice, which, if occupied and held by him, will enable him to sustain indefinitely the character of family physician. To make my meaning clear, a definition is in order. What is the meaning of the term family physician? If it means anything it should mean physician to the whole family, the apparently well, as well as the sick that are there, not simply a touch-and-go visit to a sick person.

An Open Secret.—When an infectious disease is diagnosed, a full discussion with the responsible householder is necessary concerning all the implications of the disease in question. Such a conference should always take place in the case of active tuberculosis, and is no less important in open syphilis. Most doctors observe the necessary precautions in typhoid fever, diphtheria, scarlet fever, and such diseases by comparison are relatively unimportant. The disease tuberculosis, though slow in its manifestations, is as infectious as smallpox, and when there is an active known case there are always others infected. The family physician can and should find these cases. He should also know where his syphilis cases are too. If he does not find these socially destructive plagues, and do his part in control, society will demand that machinery be set up to take over permanently the job, a purely medical task. The State has already taken steps in this direction, which in my judgment it should, and will retrace as soon as the doctor himself meets the issue. Many now think that the State should do it all, but I firmly believe that if the State does more than it is doing now in diagnosis of disease it will be adding but another drop to the poison cup now in the family doctor's hand, and thus contribute to the inevitable verdict of slow suicide. This denouement is in no sense necessary. There is no need for the doctor to take hemlock, or, what amounts to the same thing, drug himself to death with false hopes nursed in an arm chair.

Intelligent Resistance.—I contend that the doctor should not take this situation lying down. Things medical should be taken over by medical men. Those services upon which the health and physical well-being of the family depend are the business of the family doctor, and it is incumbent upon him in consultation with his fellows to find a way to meet the issue. If preconceived ideas as to medical dignity get in the way, then so much the worse for the ideas and the dignity. Life and health of the public and the physician's salvation are at stake. The family physician in the country cannot much longer sustain himself in the face of easy transportation and good roads (the airplane ambulance will be the next development) unless he proves himself indispensable. This he can do only by proving his quality as a family necessity, not for his function solely as a healer but as a conservator and health promoter. Every dotctor, in my humble judgment, should be paid a retaining fee for gen-

eral office consultation by the families in his clientele, and a separate fee for service requiring visits to the homes and for special service whether at home or in his office. Is this an impracticable suggestion? It means, of course, that the practitioner must equip both himself and a modern office so as to deserve the complete confidence of the community in his medical knowledge. The doctors that are sustaining themselves satisfactorily now are thus equipping themselves. The practice ought to be universal.

Begin Early.—Keeping an eye to the children's health, preparing them to meet the five point test, vaccinating them against smallpox and typhoid fever, immunizing them against diphtheria, testing them for tuberculosis, attending to their minor ills and accidents at hours regularly set for such service, might be covered by a retainer. It is medical service, it is protection, that is, preventive in the highest sense, and it is essential to the well-being of every well regulated family. Obstetrical and gynecological attention, tonsil and adenoid operations, setting fractures and dislocations, suturing wounds and giving other emergent surgical service as well as medical adult attention at office or home should be charged for as usual or on an agreed upon fee basis. Under such a schedule the largest part of a doctor's work will be done in his office. It would be none the less family service of the most effective kind and offer unexcelled opportunities for indoctrinating the younger generation in the desirability of checking up on themselves at stated intervals. If periodic medical examination of apparently healthy individuals is ever to become popular, it must be by demonstrating its purpose and value at an impressionable age. Such a plan, if sponsored by local medical societies, could be put into effect by business groups or clubs acting as go-between in its establishment.

Preventive Physicians. — Family doctors under this plan would be in a real sense the health officers of the community, realizing for their preventive service a stated income from the people directly benefited and in proportion to the service rendered. This it seems to me would be far preferable to a subsidy to the local doctor from the State for such service or to a State doctor hired for the purpose. One does not have to be a prophet to foresee that one of these alternatives will prevail unless some more acceptable plan devised by the doctors is instituted. State public health workers under the present regime desire earnestly that the welfare of the physician wherever he may be shall be conserved, but no one can promote that welfare so well as the physician himself. The best that can be done from the outside is to remove unnatural hindrances to his success. I do not think the doctor expects more. Less under no circumstances should be given him.

Fair Play.—So far as the State Health Department is concerned, he will have a fair field, and, in view of the indispensable nature of the public health service he can render, will be supported by it in efforts to secure substantial recognition for such service. Newer methods must supersede the old. The horse and buggy time has gone. Now railroad transportation is going. Scientific procedure has replaced rule of thumb methods, and the doctor must adjust himself to the new day or find himself in serious case indeed. Virginia medical men under the leadership of the doctors who direct the policies of State and local medical Societies will, I believe, thoughtfully consider all aspects of the doctor's situation and find means to preserve, in all its transcendent quality, the prestige, power, and affectionate regard associated with the name "family doctor."

EXAMINING MEN FOR ROAD RELIEF WORK IN VIRGINIA.

B. F. RANDOLPH, M. D., Arrington, Va.

Nelson county, in which I live, received from the State of Virginia about twenty-six thousand dollars of the money lent the State by the Reconstruction Finance Corporation for unemployment relief work on State roads. This fund is administered by the Nelson county work relief committee and men without work have to apply to it for employment. The road work is carried on under the supervision of the State department of highways.

All men seeking this relief employment are required by the State to submit to a physical examination, and it is here that the physician enters the picture. Though the fee allowed for these examinations is ridiculously small, being only fifty cents per man, it is not to be sneezed at during these hard times. On the contrary, it has been gladly welcomed by all the doctors in this neck of the woods.

Applicants for work were accordingly instructed when and where they must appear to

XUM

take their physical examination. The work orders and physical examination blanks were sent to the various doctors by the secretary of the county relief committee.

Another doctor and myself were assigned to the work of examining men at Massie's Mill, Tyro and Montebello, in Nelson county, Virginia. A total of nearly three hundred men were examined at these places, about two-thirds being white and the rest Negroes. The white men, as is usually the case in the mountain sections of the south, were of good old American stock. The applicants examined at Massie's Mill and Tyro came from near-by farms which lie east of and near the foot of the Blue Ridge mountains. Those examined at Montebello, which is located on top of the Blue Ridge at an altitude of about 2,500 feet, were what may be termed real mountaineers. They came out of the crevices, so to speak, of these grand old mountains.

Massie's Mill is a hamlet of about a dozen houses, five of which are stores. It is located about seven miles from the foot of the mountains. The men were examined here in an empty store, heated by a stove. At Tyro the examinations were held in a schoolhouse, which happened to be available on account of the day being Saturday. At Montebello, we used a church. All of the men submitted to the examination in entire good humor. Some of them were a trifle nervous.

The work was done with alacrity and dispatch, not only on account of the large number of men to be examined at each place in a few hours, but because in giving examinations for such a low fee it was necessary to work fast, if it was to be worthwhile. Two of us examined them at the rate of twenty men an hour, or ten an hour for each physician. That is, we made a fairly complete and accurate physical examination of these men at an average rate of speed of six minutes to the man. In order to do this it was necessary for each doctor to have a clerical assistant to write down the findings on the examination blanks as rapidly as they were called out.

Each doctor retained for his record a carbon copy of the examination blanks of the men he examined. I give here what I found in connection with 100 of the men I picked at random from the lot I examined. To give a clear idea of what we had to do, one of the physical examination blanks is reproduced here:

COMMONWEALTH OF VIRGINIA

DEPARTMENT OF HIGHWAYS

Physical Examination

NAME _____ AGE _____

ADDRESS _____ WEIGHT _____

HEART _____
(Comments)

LUNGS _____
(Comments)

HERNIA: YES_____ NO_____ IF SO, WHERE_____

VARICOSE VEINS: YES_____ NO_____ IF SO, WHERE _____

EYES: LEFT EYE _____ RIGHT EYE_____ (Snellen Chart Readings)

LOWER EXTREMITIES _____
(Show unusual conditions)

UPPER EXTREMITIES _____
(Show unusual conditions)

REMARKS: (Any other physical impairments found) _____

_____

THE ABOVE MAN $\frac{\text{is}}{\text{is not}}$ PHYSICALLY ABLE TO DO LABORIOUS HIGHWAY WORK.

SIGNED _____ M. D.
Examining Physician

ADDRESS _____

Dated at_____, Va.

This_____ day of_____, 1933

I shall now give an analysis of the examinations of these 100 men. Their ages ranged from 16 to 71 years. Fifty of them were from 16 to 30 years old. The average age of the 100 men was 35.3 years. Their average weight was 151 pounds.

Only one man was rejected as not being "physically able to do laborious highway work." He was turned down on account of prominent varicose veins on both legs. His age was 55 years.

The stethoscope, of course, was used in examining the heart and lungs. The entire 100 passed this test satisfactorily. The principal thing we looked for here was heart murmur. Not a single case of it was found in this 100. However, my co-worker discovered four or five cases of valvular lesions in the group he examined. Life in the open and peaceful country, no doubt, was responsible for this remarkable showing. Would a like number of men from our cities come off so well?

In the examination for hernia only one man was found to have any indications of it, and he had only a slight impulse on the left side on coughing. The other ninety-nine showed no signs of it whatever. Only three cases of varicose veins, including the one already referred to, were discovered, and the ages of the men so affected were 54, 55 and 65 years. With the exception of these three men, the lower and upper extremities of the entire group were normal.

The only abnormalities discovered were the following: One man, 57 years old, had pendulous testicles; another, 53 years old, had an enlarged right testicle. My co-worker found in his group a young Negro who had an undescended testicle.

In examining the eyes Snellen's test revealed some interesting facts. The vision of sixty-six of the men was found to be normal, the readings being 20/20. Their ages ranged from 16 to 65 years. Sixty of these men were under 50 years of age. Forty-one were under 30. Twelve men, ages 16 to 59, showed a chart reading for both eyes of 20/30. Six men showed the following readings: Left eye 20/30, right eye 20/20. Four men, left eye 20/20, right eye 20/30. Three men, ages 60, 64, and 71, showed a reading for both eyes of 20/70.

Not a single case of pellagra was found among all the men examined by both of us at these three points.

Some proud folks may regard these men as the riff-raff of society. Be that as it may, it seems to me, that the results of this physical examination of these run-of-mine Americans are very enlightening and encouraging, particularly when we consider that there must be a great lack of proper nourishment among such people during these depressed times. These men were paid only $1.50 a day and none of them were permitted to work more than four days a week. The examination is thus a sidelight on a class of our people who are so much up against it that they are eager to get these small crumbs of relief.

GENERAL PARESIS—VIEWED FROM A MODERN STANDPOINT.

BITTLE C. KEISTER, M. D., Washington, D. C.

This is a disease whose etiology and pathology have been ably discussed for the past half century by such authorities as Osler, Stephens, Cecil, Wm. A. White, and others. Notwithstanding this array of distinguished writers and thinkers, we are still in doubt about the real etiology, biochemistry and pathology of this mysterious disease, believing these semi-modern theories are speculative and somewhat cloudy and misleading. Their theory of treatment, being that of malaria, a disease entirely different in its etiology and pathology, shows at once the uncertainty of a diagnosis of this disease, basing it on the etiology of malaria. According to the above-mentioned authorities, the average age for paresis to show its worst symptoms ranges from 30 to 50 years. The cause is given as due to Spirochaetae or syphilis of the brain, and is accompanied by all of the various symptoms, such as the Argyle-Robertson pupil, certain forms of dementia, and other marked brain disturbances. It bears a close resemblance to encephalitis-lethargica, with its various reflexes—the knee-jerk, which may be abnormal according to the stage of the disease, the Babinski reflex or syndrome, as well as many others. If the Spirochaetae is a causative factor of paresis, we may have various types of it, such as bronchial, where Spirochaetae are found in obstinate bronchitis and other pulmonary diseases; in fact, these Spirochaetae may be found in any of the vital organs—the kidneys, the heart, the brain and spinal cord, as well as the intestinal canal. We may find para-syphilitic gummata in the brain, usually in the frontal convolution, involving the speech cen-

ter, causing impediments and other disturbances of speech in ordinary conversation and attempts at making public addresses. These conditions are quite embarrassing to both the speaker and his hearers. In the course of time, these gummata produce softening of the brain tissue and result finally in ulceration, giving rise to various mental symptoms, with fluctuations of temperature, headache and confusion of thought, loss of memory, etc. While paresis is considered a form of neurosyphilis by some of our modern writers, the fact still remains unexplained from an etiological viewpoint, which fact has been a fruitful subject for discussion, and is today being discussed by some of our modern thinkers and writers. This is especially true among our French writers, where this disease is quite prevalent in the hospitals of France, it being observed more frequently since the World War. But why has paresis been more frequently observed since the World War than after previous wars, especially the Spanish-American and the Revolutionary wars when we knew so little about the etiology of paresis? We may have all the symptoms of paresis, yet the greater number of these symptoms may come from other kindred diseases, such as latent tuberculosis, which was in Biblical days known as scrofula, white-swelling, leprosy, chronic malaria, etc. Then some of our modern writers are treating paresis, as previously mentioned, with quinine and arsenic, adminstered both by mouth and hypodermically, claiming good results from this treatment. Amid this confusion in etiology and treatment of this well-known disease, the writer is not quite in a position to offer any definite form of treatment, and begs to await the discussion of his paper, provided its merits deserve a frank discussion of the arguments advanced on the etiology and treatment of this obscure and mysterious malady.

The writer is strongly of the opinion, if this disease is caused by Spirochaetae of true syphilis, the treatment should be specific, and a permanent cure expected in due course of time. This applies to both acute and inherited forms, but no treatment should be commenced until thorough Wassermann and Kahn tests are properly made by a competent specialist. Would it not be better for the patient and his or her family, amid all this confusion, to ignore the uncertainty of etiology—especially in view of the unfavorable prognosis—of this mysterious malady, until its true etiology and pathology are better understood by our pathologists? Otherwise, we, as physicians, may be subjected to criticism and possibly to malpractice suits by the laity for classifying this trouble with the common genito-urinary diseases, such as pox, gonorrhoea, syphilis, etc. We cannot be too cautious in this matter, knowing the sensitive minds of the laity, especially the better class of patients, who would like to hatch up a grievance against the well-to-do physician in times of depression like the past few years have been. We are conversant with conditions of this kind, both by observation and some little actual experience; hence, take this warning, my brother physicians, and do not trust your clientele too far. We, as a profession, must not forget that medicine is not yet an exact science, and hence not immune against errors and mistakes in our etiology, physiology, biochemistry and pathology; consequently, the necessity of precaution in our diagnosis of diseases such as encephalitis-lethargica, measles, rheumatism, pellagra, etc. We are fully cognizant of the bold stand and modern theory now held by our leading authorities in classifying the etiology and pathology of paresis with that outstanding and most degrading of all venereal diseases, syphilis, which may have been contracted by the patient or his ancestry ten, twenty, or fifty years previous to the time when the main mental symptoms manifest themselves. This long interval between the time of contracting the trouble and the lapse of twenty to forty years would, seemingly, place paresis in the class with tuberculosis, cancer and other incurable diseases, or, like smallpox, affording almost complete immunity *for life*.

In view of the fact that we have no satisfactory treatment for paresis in the last stage of the disease, especially after gummata and softening of the brain tissue have appeared with the various mental disturbances, and knowing the unfavorable prognosis, I would suggest, as a last resort for patient and family, that the patient be placed in a sanatorium for life, depending wholly on careful nursing and pleasant environment, with suitable and abundance of the best diet, allowing open-air exercise in the way of drives in the parks, etc. Above all other essentials, *sleep* is one of the most important, and the writer knows of noth-

ing better, when the open-air drives fail, than an occasional one and a half grain tablet of luminal at bedtime, to be repeated when necessary, say in the course of four or six hours. The writer knows of no better, non-habit-forming drug to produce sleep for a tired brain that needs sleep and rest. Some of my surgically inclined hearers may ask the pertinent question, "What should be done to get rid of the gummata that form in the brain?" This is strictly a surgical question, and while I do not care to trespass on the surgeon's field, yet my recent experience as consultant in a very typical case of paresis convinces me that surgery for the removal of gummata or tumor of the brain should not be tolerated, only in very exceptional cases, and then attempted only by the foremost expert, whose experience in this operation should entitle him to perform so delicate an operation. These gummata, according to the above cited writers, may form in various organs of the body besides the brain and spinal cord. They have been found in the lungs, heart, kidneys, larynx, spleen and in the various blood vessels of the entire body, especially where syphilis plays a part in the etiology and pathology of any disease. We may, as a complication of paresis, have tuberculosis and other serious conditions, such as pernicious anemia, etc., also a form of epilepsy and other nervous diseases, hysteria, and the like.

In concluding this rambling paper, I wish to express my appreciation for consultations with Drs. A. A. Stephens, W. A. White, and Russell L. Cecil, well-known authorities and writers as well as professors in some of our standard medical colleges.

1438 *Columbia Road, Northwest.*

[*Symposium on Breast Cancer*]

ANATOMY OF THE BREAST.*

HARRY M. HAYTER, M. D., Abingdon, Va.

The breasts, or mammary glands, are accessory glands of the generative system. They exist in the male as well as in the female; however, in the former only in the rudimentary state, unless their growth is excited by peculiar circumstances. Growth is slight but progressive in both sexes until the time of puberty when they suffer regressive changes in the male. In the female they continue to grow and become active in the event of pregnancy. The size and dimensions of the breasts differ in different individuals, in different periods of life, and in different physiological states. They increase during pregnancy and lactation, and become atrophied in old age. The shape of the virgin breast is due mainly to its adipose tissue and not to its glandular structure. During lactation the fatty portion of the breast may disappear and leave it apparently in a shriveled condition, yet such a breast may be functionally quite active.

The breast is composed of glandular tissue, fibrous tissue, and fatty tissue. It lies imbedded in the superficial fascia. It is separated from the fascia covering the pectoralis major, serratus anterior, rectus abdominis, and obliquus externus abdominis by loose connective tissue. It may extend horizontally from the fifth interspace in the mid-axillary line not only to the sternum but beyond, so that it overlaps the latter, and vertically from the second rib to the sixth or seventh intercostal space. The posterior portion of the fascia which constitutes the capsule of the mammary gland is much denser than the remainder of the capsule, and tends to prevent the extension of interstitial abscesses into the submammary space. The deep layers of the fascia are firmly attached to the periosteum of the sternum and the deep fascia of the pectoralis, thus forming the intermammary sulcus and preventing infection from spreading across the mid-line.

The breast is developed partly from the mesoderm and partly from the ectoderm,—its blood vessels and connective tissue being derived from the former, its cellular elements from the latter. Its first rudiment is seen about the third month in the form of a number of small inward projections of the ectoderm, which invade the mesoderm.

The mammary glands may be regarded as modified sweat glands. The secreting structure consists of fifteen to twenty lobes, each of which is of itself a branched saccular gland whose lactiferous duct opens on the surface of the nipple near its apex. The main lactiferous or lobar ducts subdivide in an arborescent manner into many interlobular ducts, about which are clustered the groups of secreting alveoli, each group forming one of the many lobules included in a lobe of the gland.

The fatty tissue covers the surface of the

*Read before the Southwestern Virginia Medical Society, at Pulaski, March 24, 1933, as a part of the Symposium on Breast Cancer.

gland, and occupies the interval between its lobes.

The fibrous structure of the gland envelops the adipose tissue and glandular structure. It is a continuation of the fibrous septa of the superficial fascia. These septa are attached to the skin above, envelop and pass between the fatty and glandular lobules, and form a thin covering for the under surface of the gland. This fibrous tissue follows largely the ducts; hence, when affected with carcinoma, it contracts and draws the nipple in. The fibers that go to the skin, acting in a similar manner, produce the characteristic dimpling of the skin in carcinomatous involvement.

The nipple, located below and to the inner side of the center of the gland, has connected with it some circular and longitudinal unstriped muscular fibers. The longitudinal ones are attached to the lactiferous ducts and serve to retract the nipple, the circular ones to erect it. The nipple is surrounded by the areola. It is pink in the virgin. After pregnancy its hue becomes brownish. The tubercles of Montgomery are the numerous elevations found on the areola. They are modified sebaceous glands and enlarge during pregnancy. There is no fat in the nipple or areola.

The nerve supply of the breast and overlying skin is derived from the descending branches of the cervical plexus, by thoracic branches of the brachial plexus, and by the second, third, fourth, fifth, and sixth intercostals.

The breast is supplied with blood from above by the pectoral branch of the acromial thoracic artery. From the inner side come the perforating branches of the internal mammary artery from the second to the sixth rib. To the outer side and below is the long thoracic artery. The intercostal arteries also contribute to the blood supply of the gland.

Of far more importance than either the nerve or blood supply is the lymphatic supply of the breast. In general, it consists of a deep set around the lobules and ducts, and a superficial set which, together with the deep lymphatics, forms a plexus around the nipple called the subareolar plexus. They drain mainly toward the axilla into the lymph-nodes along the edge of the pectoralis major but also communicate with the nodes around the subclavian artery, in the apex of the axilla, the subscapular nodes, and the supraclavicular nodes. Minute lymphatic vessels extend across the sternum, uniting the lymphatics of both breasts. Other lymphatic chains follow the course of the intercostal arteries, and possibly the branches of the internal mammary artery, thus communicating with the nodes in the anterior mediastinum; and still others extend along the sheath of the rectus abdominis, entering the peritoneal cavity by way of the umbilicus and ligamentum teres.

There is an intricate network of lymphatics on the surface of muscle and on the upper side of fascia. The direction of the lymphatic current is from the muscle to the fascia; however, once the lymphatics of the fascia are involved by a carcinomatous growth, the path for direct extension to the muscle is clear.

CANCER OF THE BREAST—GENERAL PATHOLOGICAL CONSIDERATIONS.*

HARRY W. BACHMAN, M. D., Bristol, Va.

This paper is presented as that part of a symposium on Breast Cancer which considers its pathology, and, for reasons of practicality, it is obvious that the writer must limit himself to discussion of a few things that are known of the subject rather than allow himself to be led into theoretical considerations. He shall, therefore, entirely omit reference to theories of the cause of cancer. There will yet remain to him the manifestations and effects of cancer about which a great deal that is useful can be said.

Fundamentally the term cancer refers to a single cell. It derives its ultimate source from the original germ cell of the individual and its more immediate source from cells whose appearance and behavior are apparently normal. The cancer is an atavistic cell and we call it malignant because it disregards laws that govern growth and function in normal cells. It conducts its activities without regard for the integrity of other cells and itself serves no useful function to the organism. Figuratively it is a criminal and from the start it is destructive. In the early stage cancer is always localized and small. If, therefore, cancer can be recognized in this early stage it may be destroyed and the individual, as one says, cured, provided it is accessible and provided its destruction does not involve destruction of the individual. Therein lies the hope and the difficulty of the situation. Until the cause of can-

*Read before the Southwestern Virginia Medical Society, at Pulaski, March 24, 1933, as a part of the Symposium on Breast Cancer.

cer can be identified and its operation brought under control, search must continue for methods to permit earlier diagnosis.

Collectively, cancer as a cause of death is 50 per cent more common today than it was thirty years ago. At present cancer is responsible for one out of every 1,000 deaths occurring in the general population of men, women, and children. If one considers cancer of the breast alone, the same 50 per cent increase in the last thirty years is noted and today approximately nineteen out of every 100,000 of the entire adult female population will die this year of cancer. Cancer of the breast comprises about 11 per cent of all cancer, as suggested in a review of 5,080 cases of malignant disease at the Hospital of the New York State Cancer Institute in Buffalo (Schreiner and Stenstrom). From Pennsylvania, however, Wood gives this figure as about 8 per cent, so that one may compromise and say that perhaps 10 per cent of all cancer deaths are due to cancer of the breast. Probably not many of us have seen cancer in the male breast. It is involved in about 1 per cent of all cases as suggested in a collective review by G. W. Taylor covering 8,354 cases of breast cancer. This same review in 1932 also shows the greatest incidence of breast cancer to be between forty and fifty years of age, and that 62 per cent of all cases occur in the fourth and fifth decades of life as compared with 15 per cent in the third and sixth decades, respectively. An interesting observation on breast cancer relates to marital status and reproductive activity. Most women having cancer are married for the simple reason that most women are married, but Lane-Claypon, Semb, and others in analyzing the cancer population have found that, while 11 per cent of the normal female population is unmarried, 18 per cent of the cancer population is unmarried. The conclusion, therefore, is possibly valid that sexual activity and reproduction confer some protection against breast cancer, and this conclusion is further supported by Semb's figures showing a relatively greater incidence of sterile marriages with small families among women with breast cancer as compared with women free from such cancer.

When one turns to manifestations of the pathology of breast cancer it is essential to bear in mind that any localized breast tumor in a woman over twenty years of age may be carcinoma. In such the diagnosis may be evident only after microscopic study, and the clinical significance of this fact is obvious. In other words, cancer may appear as a simple lump indistinguishable clinically from a benign growth. Admittedly, however, the commonest form of breast cancer is the scirrhous carcinoma, small, hard, with ill-defined limits, the cut surface showing the coarse, white, gritty, structure with irregular coarse columns radiating into surrounding tissue. The medullary carcinoma is larger, softer, grows more rapidly and is more apt to be associated with enlargement of the breast. Recently a case of comedo carcinoma, carcinoma arising from ductal epethelium, came under the writer's observation. The contour of the breast was grossly deformed by a nodular mass beneath intensely red skin. Its appearance suggested impending ulceration. The cut surface showed an irregular tumor, the solid portions of which were broken by a few cystic areas filled with thin mucoid material, and when the tumor was squeezed it was possible to express cheesy matter from the cut surface similar to a discharge from a comedo on the face. Bloodgood also describes the cancer cyst, the malignant nature of which is grossly betrayed by the presence of bloody fluid content and microscopically by the finding of an area of cancer in the wall. Sir James Paget described a form of carcinoma that occurs in the nipple, characterized by a chronic scaling or eczematoid ulceration which is not relieved by mild disinfectants and protective dressings. Microscopically this is an epidermoid carcinoma which results in involvement of the breast as serious as the more common forms.

Perhaps the most interesting part of the story of breast cancer relates to its involvement of the lymphatics, and the story would lose much of its color if the names of certain ones who have contributed to its knowledge were left out. D. Hayes Agnew, one of the great figures in American surgery, died in 1892. William Stewart Halsted quoted Agnew as having said to him shortly before Agnew's death that he had never cured a case of breast cancer. Local or regional recurrences or metastasis explained Agnew's remark. Bloodgood is the author of the statement that the technical and anatomical adequacy of the operation as perfected by Halsted has not been surpassed today. Halsted's operation remains the best that surgery alone has done. The advances from Agnew's era in 1875 to the time of Hal-

XUM

sted's operation were along the lines of discoveries in pathology. This leads one back to other great names in surgery. In 1875 the German, Volkmann, observed that his operative results were better in cases that had involvement (metastasis) in the pectoralis major than in those without this degree of involvement. In other words, the advanced cases did better after operation than did cases that were seen earlier. In the one group, those with muscle involvement, he removed the involved pectoralis major while in the more favorable cases seen earlier it was not then his custom to remove this muscle. In studying his specimens microscopically it was Volkmann who observed cancer cells in the fascia covering the pectoralis major muscle, "even when the tumor was freely movable and a thick layer of fat remained interposed between the tumor and the fascia." This led Volkmann, as he said, to cut right down on the pectoralis muscle and clean its fibers as he would for a classroom dissection as a part of his routine operation. At this time Volkmann on occasions removed one or even both of the pectoral muscles, and it was about this time that he and his contemporaries recognized the fact that the axillary nodes were usually involved even when they could not be felt, and he suggested that it might be well to explore the axilla in every case. The first, however, to advocate systematic cleaning out of the axilla was the German, Kuster, who reported his cases between 1871 and 1885.

In America, however, the genius of Halsted was at work. Not only did he confirm Volkmann's observation of cancer cells in the fascia of the pectoralis major, he found them in the fascia between the pectoralis major and minor as well, and it was but a step from this to his doctrine of the centrifugal spread of cancer by way of the lymphatic plexus in the fascia covering the pectoral muscles. Halsted did not report his perfected operation until 1890 when it appeared in the *Johns Hopkins Hospital Reports*, but as early as 1882 one finds that he was routinely cleaning out the axillary space and in almost every case removing the pectoralis major. In the complete operation that he eventually described, he was removing both the pectoralis major and minor as well as cleaning the axilla and supra and infra clavicular spaces.

Another figure whose contribution will probably prove of lasting value is that of W. Sampson Handley, of London. Handley, writing about seventy-seven cases in 1927, said that he did not believe enlargement of the axillary glands is in itself a lethal factor, for recurrence in the axilla is rare after an efficient operation. He emphasized, however, that by the time the axillary glands are enlarged the disease has frequently and perhaps usually obtained access through the inner ends of the intercostal spaces to the nodes lying along the internal mammary artery, and that quite early and in still operable cases these glands contain microscopic deposits of cancer cells. He supported his contention by reporting that the use of radium in the intercostal spaces over these nodes post-operatively prevented recurrence in these areas in all but five instances, and in four of these the recurrence was at a site below that where radium had been used. Thus we may sum up the work of Volkmann, Kuster, Halsted, Handley and many others by saying that breast carcinoma disseminates itself by way of the deep lymphatic plexus to involve the supra and infra clavicular lymph nodes, the inferior, middle and superior axillary nodes and the nodes lying along the course of the internal mammary artery. But this is by no means the extent of metastasis in breast cancer. Visceral involvement, particularly to the liver by way of the round ligament, and to the lungs, is common, and the skeleton is frequently attacked. Distal to the elbows and knees the bones escape cancerous invasion except in rare instances. Subcutaneous nodules of cancer occur almost as widely as metastasis to bone. The mechanism of this remote metastasis has received much discussion. Handley has strongly supported the adequacy of the theory of lymphatic dissemination, but Schmidt found minute cancerous emboli in the terminal pulmonary arteries in all of fifteen cases of abdominal carcinoma coming to autopsy. Thompson and Keiller found widespread metastasis without lymphatic involvement, and concluded that dissemination can occur by way of the blood stream. Schmidt holds, however, that most cancerous emboli become encapsulated and degenerate, and thus become harmless.

Certain biological features of the cancer cell influence the prognosis in breast cancer. One refers here to Broder's grade, or index, of malignancy. Carcinomas composed of cells which are highly undifferentiated, with no tendency to assume any regular architectural

arrangement, comprise his grade IV, and in these widespread and rapid metastasis occurs and the prognosis is rendered more unfavorable thereby. Those composed of cells which more closely resemble normal cells in arrangement and appearance are his grade I, and in these the prognosis is relatively more favorable. Time and experience seem to be confirming the validity of Broder's observations.

CANCER OF THE BREAST—SYMPTOMS AND DIFFERENTIAL DIAGNOSIS.*

BEVERLEY F. ECKLES, M. D., Galax, Va.

Symptoms

In approaching a discussion of the symptoms of cancer of the breast, let us first recall some facts about cancer in general, and then consider the particular symptoms to be looked for in suspected cancerous involvement of the breast.

Cancer is at its beginning a local disease. Sooner or later, through the peculiar property of metastasis it becomes more widespread, often resulting before death in a generalized carcinomatosis.

Time was when the only decision confronting the physician in most cases of cancer was whether the condition was operable or inoperable. The emphasis placed on instructing the public as to the symptoms and treatment of cancer in late years has made the laity consult physicians more frequently and much earlier with regard to suspected cancers. This has increased the physician's responsibility and has complicated his duty to these patients. He must know a great deal more of the differential diagnosis of cancer than was formerly necessary, and his advice must be directed towards preventing the development of cancer when it is not already present, and towards the most efficient and complete control of it at the earliest possible moment when it is found.

The breast conditions with which we have to deal fall naturally into three groups: In the first group are those conditions that are frankly and certainly benign; in the second, those conditions that are equally frankly and certainly malignant; while the third group comprises that large number of cases occupying the border-land between these two.

The first group offers no serious problem—if the condition be, for instance, a simple cyst or a fibroma, its excision will effect cure.

The second group is also easily disposed of. The old question as to operability must be decided, using the X-ray to determine possible intrathoracic or osseous metastasis, and careful abdominal examination to determine whether metastasis has occurred in the liver or other intra-abdominal organs. We must decide whether our treatment shall aim at cure or mere palliation of the condition present.

It is the large intermediate group, neither frankly benign nor certainly malignant, that gives us our chief concern. The diagnosis rests upon a very complete history; a careful physical examination, or perhaps repeated examinations; and, as a last resort, microscopic examination of the suspected tissue obtained by biopsy.

Certain predetermining or predisposing factors claim our attention in considering the symptoms of breast cancer: *Age.* We are accustomed to think of breast cancer as a disease of middle life, and certainly most cases do occur between the ages of forty and sixty. Middle age and its associated condition, the menopause, predispose to cancer, but it is a great mistake to believe that cancer of the breast is rare before forty. It is also usual that the younger the subject, the more deadly the disease. We should never rule cancer out merely because of the patient's age. *Sex.* Cancer of the breast is overwhelmingly more frequent in women, because the male breast is not a functioning organ. However, from 1 to 3 per cent of all breast cancers have occurred in men. *Heredity.* The influence of heredity in cancer is still a disputed point. In general, where we find a number of cases of cancer occurring in one family we are justified in adding another link to our chain of suspicion that the individual in question is suffering with cancer. *Pregnancy and Lactation.* The role of previous lactation is also indefinite. Breast cancer occurs most often during the years when the breast is most active, whether the woman has borne children or not. It is certainly true that the influence of pregnancy and lactation on a cancer already present renders the condition practically hopeless. *Trauma.* The factor of trauma has been widely discussed. The development of a tumor from a single trauma must be extremely rare, if it ever has occurred. If we consider the effects of chronic irritation as trauma, the relation-

*Read before the Southwestern Virginia Medical Society, at Pulaski, March 24, 1933, as a part of the Symposium on Breast Cancer.

ship comes closer. Breast cancer may develop in a scar following drainage of an abscess. *Chronic Cystic Mastitis* furnishes an example of this type of trauma which may result in cancer. This is especially the case where there are intracystic papillomata. Probably not more than 10 per cent of the cases of chronic cystic mastitis eventuate in cancer, but cancers have developed in breasts from which areas of cystic disease have been previously removed by a plastic operation, and it certainly seems much safer to remove the breast if this condition is generalized throughout it, accompanied by more or less induration.

The chief symptoms and findings of cancer of the breast may be illustrated by describing a typical case. The patient is usually a woman who states that she accidentally discovered a lump in one of her breasts some time before she presents herself for examination. If the lump is large and has been present for a considerable while, she may say that she has become aware of the increased weight of that breast. If there is a large amount of fibrosis and contraction of fibrous tissue present, the breast may stand out more prominently from the chest wall and the nipple may be at a higher level than before. Usually the growth is painless, but if it occurs in an existing chronic mastitis, as is sometimes the case, periodic pain will be present. Occasionally it is true that pain precedes the development of the tumor by months, and in such a case a careful watch should be kept for the earliest signs of development of an indurated mass. The tragedy of cancer of the breast lies in the fact that the lump is so often completely symptomless, and the woman waits for some change in it before consulting her physician. It is hard for her to believe that a condition causing no discomfort may be serious. Either because she is sure it does not amount to anything, or because she fears to know the truth, she procrastinates and puts her life in jeopardy.

On examination, if the case be early, there will be found a rather hard, firm, ill-defined mass, not adherent to the skin or to the underlying tissues. A fully-developed cancer will present retraction of the nipple, fixation and dimpling of the skin, a large, fixed tumor, and involvement of the axillary and other lymph nodes with carcinoma. Such findings as ulceration of the overlying skin, cachexia, generalized pain, intra-abdominal or other distant metastases, are not symptoms of breast cancer, but of approaching death. One must keep in mind that while cancer of the breast is almost always manifested by a single lump, it is not impossible to have a benign and a malignant tumor present at the same time. The other breast should always be carefully examined also for two reasons,—first, because bilateral cancer does occur (though only in advanced cases); and, second, in order to get a clearer idea of the patient's normal.

Discharge from the nipple accompanies from 3 per cent to 5 per cent of the cases of carcinoma of the breast. While bloody discharge may occur in other conditions, it should always excite suspicion of cancer, even in the absence of other signs. The patient should at least be kept under observation until the correct diagnosis can be made.

Let us remember that cancer is primarily a local disease. If seen early, before the axillary and other lymph nodes are involved, it may be impossible to differentiate from a simple tumor. In such a case, the only certain way in which the diagnosis can be made is by examination, macroscopically and microscopically, of the growth itself. While excision of the growth may not be without danger, the concensus of informed opinion seems to be that the value of the information thus obtained outweighs the danger risked in obtaining it. It should be added that the one who excises the growth must be able to tell cancer from other growths and must be prepared to proceed at once with the radical operation, if cancer is proved to be present. The risk of disseminating a cancer is probably lessened by avoiding squeezing or pulling upon the growth while removing it, and by removing it surrounded by a wide margin of normal breast tissue.

Differential Diagnosis

Cancer of the breast must be differentiated from abnormal involution (called also cystic disease of the breast, chronic cystic mastitis, cystadenoma, or Brodie's disease) benign fibro-epithelial tumors, sarcoma, tuberculosis, syphilis, simple cysts, and rarely from chronic pyogenic mastitis and actinomycosis.

From Abnormal Involution. It may be impossible to differentiate between these conditions in the earlier stages. In a well-marked case of abnormal involution its widespread nature, frequent bilateral occurrence, cysts, pain, and greater sensitiveness on pressure,

with absence of dimpling of the skin or attachment to the pectoral fascia will disclose its nature.

From Benign Fibro-Epithelial Tumors. These usually occcur in younger subjects than do carcinomata. If not infected, they are freely movable, well-defined, encapsulated, round and lobulated. They have an even, firm consistence. If cystic, these findings may be modified. Usually there is no retraction of the nipple or axillary involvement. Intracystic papilloma usually gives bloody discharge from the nipple and so frequently undergoes malignant change that biopsy is advisable where this condition is present.

From Sarcoma. Peri-ductal sarcoma grows rapidly, is encapsulated, multilobular, soft and frequently cystic. The skin is not attached unless the tumor is about to ulcerate, so that it is freely movable. The veins over the growth are dilated. The axillary nodes are not involved. The sarcoma arising from the breast stroma may be impossible to differentiate at first. It is very rapid in its growth, usually occurs in young women, and causes no axillary involvement.

From Tuberculosis. Typical tuberculosis of the breast runs a rapid course. It is usually secondary. There are early fistula formation, early involvement of the lymphatics, localized tenderness and pain. Tubercle bacilli may be found in the discharge. Ulceration may be extensive but does not resemble cancerous ulceration. In the acute disseminated nodular type sometimes occurring during lactation the nodules are scattered throughout the breast. The sclerosing variety presents a mass which, in the absence of abscess formation, resembles cancer closely. This is not a rare form of the disease. The pre-operative diagnosis is uniformly cancer.

From Syphilis. Syphilis and cancer may co-exist. Chancres, tubercular syphilides and gummata resemble cancer. The Wassermann test, the examination for the treponema pallidum, and the therapeutic test will usually lead to the correct diagnosis. The therapeutic test is probably best used where there are positive or suspicious blood findings. If the tumor does not yield promptly (within two or three weeks) to antisphilitic treatment, it may be safer to operate.

From Simple (Retention) Cysts. These single cysts are rounded, smooth, freely movable, elastic, rarely tender, do not infiltrate their surroundings, or adhere to the skin or pectoral fascia, or cause retraction of the nipple. Galactoceles often impart a doughy feeling on palpation and may pit on pressure. It is well to remember that malignant change may take place in the walls of these cysts, and that excision of them is the wisest course.

From Actinomycosis. This is too rare to merit discussion. The diagnosis has never been made until elimination of all other diseases causes search for the ray fungus.

From Chronic Pyogenic Mastitis. Circumscribed areas of chronic mastitis, without tenderness or softening, can resemble scirrhus cancer so nearly as to be impossible of differentiation without operation. Such a case presents sclerosis as its predominant characteristic, often with retraction of the nipple, adherent skin and axillary involvement. Usually it is possible to elicit the history of a more or less acute stage of the disease which will give a clue to the diagnosis.

It may make the diagnosis of breast cancer somewhat less difficult if we recall that a great majority of all single tumors occurring in the breast after the age of forty are cancer, and if we look on every single tumor occurring in every breast as a possible cancer until it is proved to be benign. It may also help to keep in mind the natural history of this disease, and to make frequent subsequent examinations if the condition is not clear-cut when the patient first presents herself. In such a case, early exploration will disclose the true nature of the condition and may save a life.

TREATMENT: X-RAY AND RADIUM—END RESULTS.*

J. T. McKINNEY, M. D., Roanoke, Va.

From a careful review of available literature and study of the records of many clinics, together with an analysis of our own results in carcinoma of the breast, it is our opinion:

1. That all operable cancers of the breast should be referred for surgery at the earliest possible time.

2. That in advanced cases with axillary and glandular involvement, even though in the presence of ulceration, the breast tumor should be removed.

Some of the newer methods of pre-operative diagnosis of lesions of the breast by means of

*Read before the Southwestern Virginia Medical Society, at Pulaski, March 24, 1933, as a part of the Symposium on Breast Cancer.

roentgen-ray studies of both breasts do not come within the scope of this paper, nor does the question of the type of the operation, whether simple excision or radical removal, properly belong in this part of the symposium.

It is advisable in all cases, and especially if there is glandular involvement, to X-ray the chest for metastasis, as well as portions of the skeletal system, particularly if constant pain is present. This cannot be too strongly emphasized, for often a patient who complains of rheumatism, neuritis or lumbago already has bone metastasis, and it is obviously useless to subject this patient to a mutilating operation. Metastasis to the bones occurs later than pulmonary metastasis, but is next in frequency—usually one bone is affected, though there may be a widespread involvement present.

The following is the frequency of metastasis to the skeletal system that we have observed in a series of fifty-four cases of post-operative cancer of the breast which we have had under observation for the past six years:

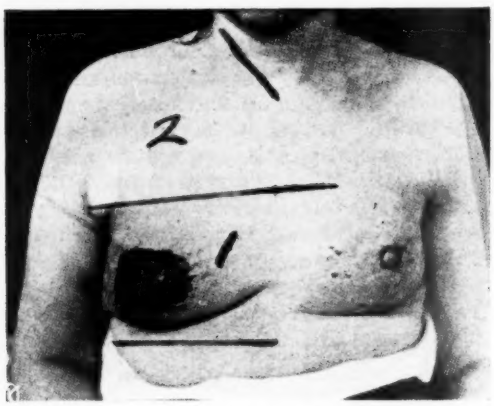


Fig. 1.—Areas for X-ray therapy.

1. Bodies of the vertebrae, usually the lumbar (six cases). The pain is most intense, probably causing more suffering than metastasis in any other portion of the body.
2. Pelvic bones, near the acetabulem (one case).
3. Femur (two cases).
4. The ribs—multiple (one case).
5. The skull (one case).

The humerus, clavicle and long bones of the extremities are rarely involved.

In this series there have been eight known cases of metastasis to the lungs.

Frequent modifications in the technique of X-ray treatments have been made, and differ considerably with the roentgenologist. While we have in the past treated cancers of the breast pre-operatively, it is not our present routine. Following surgical removal, we begin post-operative X-ray therapy as soon as practical, usually ten days to two weeks after the operation. Five areas are treated:

1. The mammary—in front.
2. Supra-clavicular.
3. Mammary from the side.
4. Axillary.
5. Upper part of the chest posteriorly, radiating the axilla and supra-clavicular regions.

Before the advent of high-voltage machines our factors were 135,000 peak KV, four to six millimeters of aluminum filter, fifteen-inch target distance, twenty-five to thirty minutes exposure time. Treatments are given at intervals of two to three days. We usually repeat this series in three months and frequently give another series six months later, keeping the patient under close clinical observation for a period of at least two years. No definite routine or standardization for all cases can be made. The size and age of the patient, the amount of axillary and mammary fat, the glandular involvement present and the appearance of recurrences all enter into making each case a subject of special study.

Our results following the use of the higher voltages, 200,000 KV, delivered from the new type valve tube rectification transformer with the Westinghouse therapy tube, 50 cm., S. F. D. .5 mm. cu., 1 al filter, 5 MA., giving an erythema dose of 800 to 900 R. to the areas outlined above have given somewhat better results, there possibly being fewer local recurrences. In very obese patients and in treating the upper posterior chest and axillary areas, the higher voltage with heavier filtration has some advantages over the lower voltage technique, and should be used. However, when carefully carried out, it is doubtful if the results obtained are much superior to the 135,000 KV technique. This, at least, is substantially the opinion of DesJardins at the Mayo Clinic, Herendeen of the Memorial Hospital in New York City, and many other capable men. The amount of absorption of the X-rays is the important thing, and I believe the more frequent repetition of treat-

ments, using the lower voltages, possibly tends to prevent recurrences and metastasis.

In metastasis to the skeletal system as well as to the lungs, great relief from pain can be accomplished by radiation. The 200,000 KV technique for treating metastasis to the skeletal system is more efficient than X-rays of low voltage. In all treatments of the breast, the skin tolerance dose should be kept in mind, and, if this is done, too much radiation with severe reaction should not occur. Occasionally pulmonary fibrosis is seen to follow excessive radiation for mammary cancer. However, careful attention to technique should make this an infrequent complication.

Ewing has pointed out in sections made following radiation, that there is an engorgement of the blood vessels, a lymphocytic exudate, with hydropic degeneration, and vacuolation of the tumor cells, hyperchromatism of the neuclei, and granular detritus in the connective tissue. Later, the blood vessels show an obliterative endarteritis, with marked increase in the connective tissue and decrease in the number of cancer cells.

Statistics generally show where early operation has been performed and radiation has been carried out, and where no glandular enlargement was noted or found to be present at the time of operation, that five-year cures can be expected in from 75 to 80 per cent of cases. Where glandular involvement is present the average percentage of five-year cures is 5 per cent, though a few of the European writers report as high as nineteen per cent. An analysis of fifty-four operable cases recently studied in our series vary little from the above.

Opinion as to the use of radium in the treatment of cancers of the breast is widely at variance. Some excellent clinics use radium packs, others interstitial irradiation, and still other operators place radium directly beneath the skin flaps, burying it in the tissues at the time of operation. The time of application in the hands of most radiologists or surgeons is usually following operation, though occasionally radium is used pre-operatively. When radium is used, X-ray therapy is in the large majority of instances combined with it.

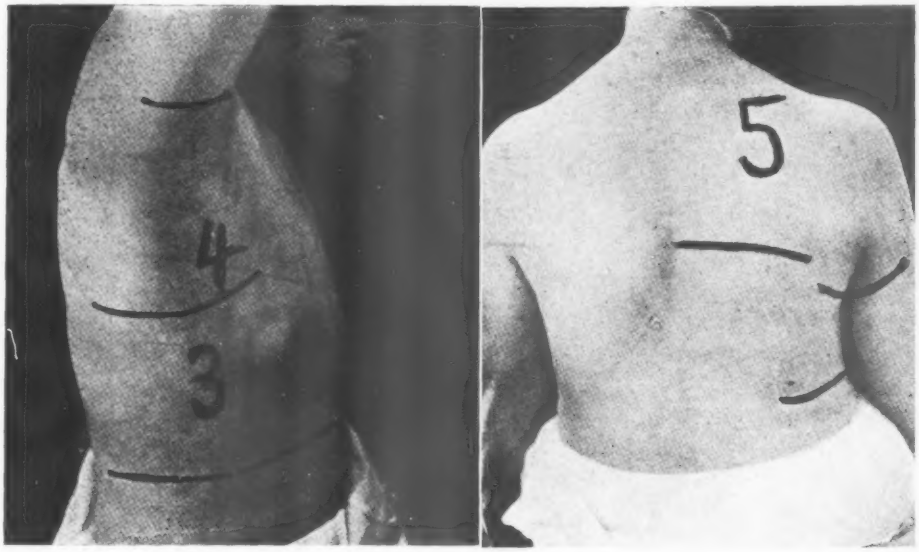


Fig. 2.—Areas for X-ray therapy.

Dr. Burton James Lee, Quimby, Pack, and their co-workers at the Memorial Hospital in New York City have within the past few years done some excellent work with interstitial irradiation. Their observations and conclusions have changed from time to time, but in their latest published report from the *Archives of Surgery*—1932, they advise for primary operable mammary cancer external X-ray treatment, then interstitial irradiation, and, finally, radical amputation six weeks later. They are now grouping their primary operable cancers of the breast into three groups for the pur-

pose of evaluating the different methods of treatment:

1. Surgical intervention alone.
2. External and interstitial irradiation, followed by surgical intervention.
3. Irradiation alone.

At the Lewis-Gale Hospital we have used radium in some of our cases, but do not advocate it routinely.

We do consider, however, that the use of the electric knife is a definite advance in technique, which will probably lessen recurrences and metastases.

Dr. Francis Carter Wood, Director of the "Crocker Institute of Cancer Research," Co-

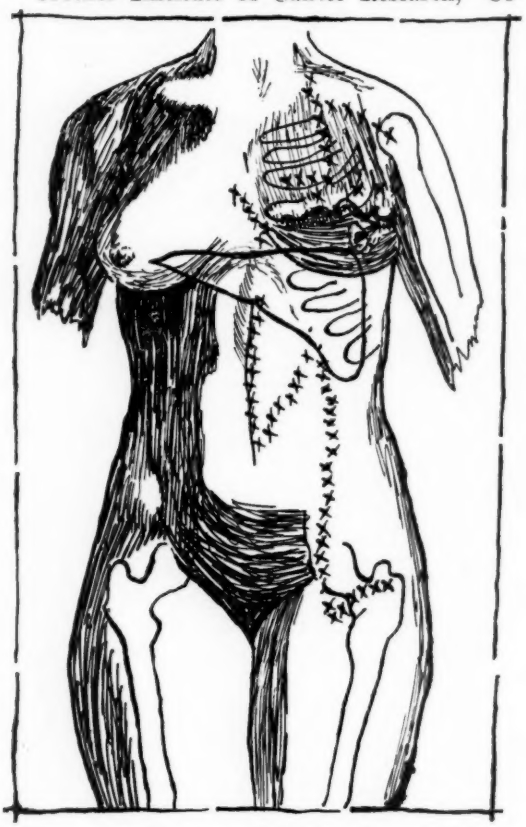


Fig. 3.—Illustration showing lymphatic drainage from cancer of the breast with most frequent sites of metastasis.

lumbia University, New York City, in a personal communication of a few days ago, says: "I am not convinced that the insertion of radium in any form in the breast is an effective method of treatment; certainly everyone realizes that even though the patient may be clinically well after extremely heavy radiation, viable cancer cells will be found on careful examination."

Summary

1. We believe all operable cancers of the breast should be removed surgically.
2. Even in the inoperable group with glandular involvement the tumor should be excised.
3. We feel certain that post-operative X-ray therapy properly carried out for each individual case lessens local recurrence and metastasis and prolongs the life of the patient.
4. As generally applied, we do not advocate the use of radium, but, if used, we feel a course of previous X-ray therapy should be given previously to the radium implantation.
5. Continued education of the laity to seek early examination and treatment for all lumps or nodules noted in the breast will greatly lessen the mortality from cancers of the breast.

Bibliography

Bevan, A. D: Tumors of Breast from Standpoint of General Practitioner and Surgeon. *Jour. Am. Med. Assn.*, November 1, 1930, Vol. 95, No. 18. pp. 1311-1315.

Desjardins, A. U: Radiation in Cancer of the Breast. *Texas State J. M.*, 1923-24, xix, 384-391.

Evans, W. A., and Leucutia, T.: Deep Roentgen Ray Therapy of Mammary Carcinoma. *Am. J. Roentgenology*, 1925, xiv, 135-148.

Harrington, S. W.: Carcinoma of the Breast; Surgical Treatment and Results. *Jour. Am. Med. Assn.*, 1929, xcii, 208-213.

Lee, B. J., and Herendeen, R E.: An Evaluation of Pre-operative and Post-operative Radiation in the Treatment of Mammary Carcinoma. *Ann. Surg.*, 1925, lxxxii, 404-412.

Lee, B. J., Pack, Geo. T., Quimby, Edith H., and Stewart, Fred W.: Irradiation of Mammary Cancer, with Special Reference to Measured Tissue Dosage. *Archives of Surg.*, March, 1932, Vol. 24, pp. 339-410.

Levin, Isaac: Proper Co-ordination Among Surgery, Radium and X-Ray Therapy in Cancer of the Breast *Radiology*, November, 1931, Vol. xvii, 1013-1027.

Pfahler, Geo. E.: Results of Radiation Therapy in 1,022 Private Cases of Carcinoma of the Breast from 1902 to 1928. *Amer. Jour. Roentgenology*, April, 1932, Vol. xxvii, 497-508.

Sistrunk, W. E, and McCarty, W. C.: Life Expectancy Following Radical Amputation for Carcinoma of the Breast; a Clinical and Pathological Study of 218 Cases. *Ann. Surg.*, 1922, lxxv, 61-69. Also *Tr. South. Surg. Assn.*, 1920, Phil., xxxiii, 160-179; *J.-Lancet*, 1922, xlii, 75-81; *Penn. M. J.*, 1920-21, xxiv, 781-786.

Taylor, Grantley Walder: Cancer of the Breast. *International Abstract of Surg.*, July, 1932, pp. 1-20.

Trout, H. H., and Peterson, C. H.: Cancer of the Breast. *Jour. Amer. Med. Assn.*, November 1, 1930, Vol. 95, No. 18, pp. 1307-1310.

Warren, Stafford L.: A Roentgenological Study of the Breast. *Amer. Jour. of Roentgenology*, August. 1930, Vol. xxiv. pp. 113-124.

Medical Arts Building.

TREATMENT BY OTHER METHODS, WITH RESULTS.*

HUGH H. TROUT, M. D., Roanoke, Va.

To be given the title "Other Forms of Treatment with Results" is, at best, a difficult assignment, but, when one does not know to what extent "Other Forms of Treatment" are to be discussed, then this title becomes an impossible task. In looking over the program, the most striking omission is the absence of any mention of the Surgical Treatment of Carcinoma of the Breast, and this, after all is said and done, is the most important single aid in our attack on this disease.

I believe the best way for me to approach this problem is to state what I believe would be the method in which I would handle a case of carcinoma of the breast just as if the patient were making her first visit to my office. Of course, we are assuming that the diagnosis of carcinoma of the breast has definitely been made, as has already been outlined in this symposium.

I am sure the first problem to be solved is to ascertain as far as possible if the case is operable or inoperable, but, I would also try to estimate the patient's mental reaction and intelligence. If the patient is sufficiently intelligent to have control of her mental reactions, I would inform her quietly of the serious nature of her trouble, but at the same time, impress upon her that with her cooperation her chances of a cure are good. If the patient was not intelligent and was "nervous," I would say nothing about pre-operative irradiation. I have had some rather distressing experiences with pre-operative irradiation. Some of the patients who have had such treatment and been temporarily improved by such treatment, take the management of the case in their own hands, and the next time I have seen these cases they have reached the inoperable and hopeless stage of the disease. This is a real and not a fanciful complication in the management of these cases.

If the patient's mental condition is such as to even raise the question to my mind that I will not have her intelligent assistance, then I do not mention anything about pre-operative irradiation.

"Cancer phobia" is another real condition that needs serious consideration. Recently, in a certain medical center, a surgeon obtained the services of a psychiatrist to straighten out the mental condition of the surgeon's carcinomata cases after the surgeon had "talked over the situation" with the patients. "Time" summed up the report of this situation by remarking, "It has become a question of whether to let people die cancerous and sane, or witless from suspicion of cancer." With tact, honesty and intelligent management "cancer phobia" can be made to disappear.

When one realizes that cancer is now the second in frequency among the causes of death and even contests with "heart disease" for the first place, it is time for all of us to feel worried. However, we medical men should be able to not over-emphasize this condition. I believe the patient should be told very clearly and honestly what the surgeon thinks her chances of a cure are, and, of course, this largely depends on how early the surgeon sees the case. If this one fact—the earlier the case is seen the more certain will be the cure—is sufficiently impressed upon the patient, such education will go a long way toward solving the cancer problem. We should all recall the slogan of the American Society For the Control of Cancer—"Fight Cancer With Knowledge."

Of course, we all agree that education, radical surgery and irradiation furnish the tripod on which our hopes rest in the cure of cancer, at least until the time comes when the cause of this disease is finally and definitely known. The meaning of "radical surgery" varies but little in the estimation of different surgeons. It means to my mind the complete removal, in block dissection, as far as possible, of the mammary gland, both pectoral muscles, sheath of the rectus muscle and a thorough "cleaning out of the axilla" without unnecessary traumatizing the tissue during the operation,—in other words, the so-called Halsted operation.

In an editorial by Emile Holman, in *S. G. and O.*, November, 1932, he stresses the danger of repeated examinations of the carcinoma of the breast cases, thereby increasing the danger of invasion by the way of the lymphatics and blood stream. As early as 1880 Wrigert demonstrated microscopically that cancer cells directly invade the walls of blood vessels traversing the tumor. Schmidt found emboli of cancer cells in the small pulmonary arteries without macroscopic evidence of involvement of the lung. Holman further expressed the opin-

*Read before the Southwestern Virginia Medical Society, at Pulaski, March 24, 1933, as a part of the Symposium on Breast Cancer.

ion that the "treatment of cancer is an emergency measure about as compelling as appendectomy for acute appendicitis since it is fraught with even greater danger. A cancer cell, hanging on the brink of a swiftly moving blood stream may be broken off at any moment and carried beyond reach of effective treatment. Numerous circumstances may hasten this ultimately fatal incident. Massage, the application of heat, iodine or salves can serve only to increase the hazard of embolic metastases and to multiply completely any later attempts which may be made to control the disease."

Tyzzer has demonstrated that repeated massage of malignant tumors in mice doubled the number of metastases outside of the original tumor. This, as well as much clinical evidence, should make us realize the necessity of gentle and not frequent examinations of a case of carcinoma of the breast. We should not be guilty of blaming too severely a patient for "feeling her breast" frequently when we insist on numerous examinations by medical students in our clinics. Let's be consistent in this and examine our breast cases gently, and if we are suspicious of malignancy see that proper treatment is instituted without delay.

In a recent report from a large teaching hospital only 12.2 per cent of 573 patients lived ten years or more after operation, while in a hospital where very few examinations were made reports showed 44 per cent living ten or more years, and over 13 per cent of these with axillary involvement lived that long.

There are various types of incisions for the operation in the radical removal of the breast, but, of course, the incision should be made to fit the individual case. Dr. Halsted used to say he felt the surgeon who was going to sew up the incision should not be allowed to make the incision, for, in this way, no attempt would be made to save skin. In other words, the incisions should be made so as not to come anywhere near encroaching on the tumor.

Whether this incision should be made with cold knife, the "radio" knife, or the hot cautery depends largely upon the ability of the surgeon to employ successfully these last two electrical additions to the surgeon's armamentarium. As an example of what I mean, my partner, Dr. A. P. Jones, employs the so-called "radio" knife to make his skin incisions and checks the hemorrhage by simply touching the handle of the clamps with the point of the electrical needle. In this way he eliminates much buried suture material. Of course, he ties the larger vessels. I personally have not been able to make the skin incisions with the "radio" knife with much success, and "cleaning out" the axilla with a hot blade near the axillary vessels does not add one thing to my comfort, for I can't help but think of what might happen were the cautery to burn a hole in the vein or artery. However, there is no question that controlling the hemorrhage by touching the handle of the hemostat with the tip of the electrical unit saves time, lessens the amount of suture material buried, and is safe. Another point of which I am certain is that were I able to use the "hot" cautery in the wonderful manner with which Dr. A. C. Scott employs it, I would also use the same.

The excellent healing of the skin edges after having been severed with a cautery surprised me greatly, but in the few cases in which I have tried this method, I have not been as successful as Dr. Scott.

After doing as complete and as radical removal as is possible, then we add one more factor to aid us in our fight against local recurrences. This is by the addition of radium placed under the skin, properly protected and withdrawn after the correct dosage has been given. Most radiologists and pathologists agree that carcinoma of the breast is more radio-resistant than epithelioma, and that in order to make radium effective it is best given in the interstitial manner. The placing of the radium in the line of the internal mammary vessels and in the axilla meets such a condition. In this way, the radium is buried under the skin and in a field in which there might be some cancer cells left and within reach of the irradiation.

Recently there have been many articles decrying the indiscriminate distribution of radium emanations to doctors who have not studied the dangers of this element, and all of us have seen some bad results from such practice. I am sure, unless the radium is properly screened and removed as soon as the correct dosage has been given, much harm will be done. This can only be estimated by someone who understands the physics of this useful and dangerous surgical adjunct.

In about ten days after operation, irradiation with a 200,000-volt machine is started. This time is largely determined by the condi-

tion of the incision and the amount of radium employed at the time of operation.

To give the results of any form of treatment regarding death within a certain period of time is easy to do, but any such series is almost worthless when comparing with another method of management, for the two series may vary so markedly in the types of patients. For awhile it was thought by using the histological classification of Broders or the clinical index of Lee and Stubenbord that we might arrive at some arrangement which would be of comparative value. It was soon seen that the individual equation of the pathologist or clinician entered so largely into the question that neither of these methods could be depended on as a basis of comparison. However, either one of them is of prognostic aid, and in recent years we have been employing both.

I feel that any series of results which does not contain at least 75 per cent of replies to the "follow-up" is useless, for such a series contains many patients that are dead, and such cases are simply excluded from the series unless all cases failing to reply are estimated as having died, and such a method is manifestly inaccurate.

At the last meeting of the American Surgical Association, Matthews reported a series of 218 unselected cases, with 23.9 per cent surviving the ten-year period, and 37.8 per cent surviving the five-year period. The axillary glands were involved in 67 per cent of all these cases. Incidentally, in our series of 386 cases we have found a fairly large number of glands, that were removed from the axilla, were inflammatory, and did not show malignant invasion on serial sections. Also it has been very interesting to me to note that one large gland in the axilla apparently gives a better prognosis than numerous small hard, shot-like glands.

Up to this point we have been assuming that the case was one a surgeon could consider as being operable. Of course, the term "operable" varies with different surgeons, and, as a general rule, the more experience a surgeon has had with carcinoma, the less hopeful he will be concerning the prognosis. However, I think most of us feel the term "operable" means to apply to cases in whom we have a reasonable hope of curing without local recurrences or metastases. I recall far too large a number of cases in which operations have been done on the breast, when if X-rays had been taken of the skeleton, metastases would have been demonstrated.

We try to insist on routine X-ray examinations of the lungs and skeleton in every case of carcinoma of the breast before operation. As a result of this practice, we have been saved the mortification of adding a useless operative procedure to the discomfort of a patient whose body is riddled with metastases. Even if such an X-ray examination is not made as a routine practice, it should certainly be done if there is any pain in any part of the body. Perhaps I feel this point too keenly, for I recall operating on a doctor's mother for carcinoma of the breast, and before she left the hospital she complained of pain in the pelvis, and X-ray showed extensive metastases. Since this needless calamity we have made such X-ray examinations as a routine practice.

If a patient has no metastases, but has a tumor and glands that cannot be removed, what is the surgeon going to do about it? There is one school of surgeons who feel that nothing should be done to give these patients any comfort, but to return them to the localities from which they came, so that they might be object lessons—illustrating the dangers of delay.

I, personally, have never been able to wean myself from the old-fashioned idea that the physician's duty is to the individual patient who has every right to expect to receive the same advice and attention he would have were the patient and the doctor to trade places. One important point to remember in making a decision in these cases is to recall that cancer is not as active in old people as it is in younger folks. In other words, many a case of cancer of the breast in old people can be removed without recurrence,—often when the growth is large and ulcerating. In younger patients, such is not the rule. Irradiation is often of great aid in such cases, and occasionally a case which looks to be perfectly "inoperable" is made "operable" by the employment of properly given X-rays.

In 1921 I reported the apparent effect of pregnancy in the remaining breast after the first breast had been removed for carcinoma. We were not able to find a single case of pregnancy occurring in such a patient that did not develop a very active malignancy in the remaining breast. Of course, the practical application of this observation is to caution the

XUM

patients who might become pregnant after having had a cancer of the breast removed, to avoid future pregnancies. This is naturally a very limited number, for most of these cancer cases are well beyond the age of pregnancy.

As I have indicated, the analysis of any "results" of any series presents so many impossible factors on which to make any accurate deductions in comparing the virtues of one method with another that all such comparisons are practically worthless. However, we do know that the immediate mortality is low—usually under one per cent. I have often been impressed with the apparent ease and comfort with which many of the very old ladies stand operations.

Our own results have been divided in results of the entire group in periods of five, seven and ten years after operation. Out of the 386 cases, we have been able to "follow-up" 328 of these cases, or about 87 per cent of the entire series. From 1909 to 1920 there were 152 cases with 22 per cent free from recurrence or metastases after five years. During this period we only employed radical surgery.

From 1920 to 1924 there were eighty cases with 30 per cent of five-year "cures." During this period, radium was implanted under the skin, combined with radical surgery.

From 1924 to 1933 there were 154 cases with 55 per cent of five-year "cures." During this period, deep therapy X-ray has been added to radical surgery and radium implantation.

Had those cases having axillary glands been excluded, the percentage of five-year "cures" would be considerably higher. In records compiled from thirty-three hospitals in the United States, the percentage of five-year "cures" varies from 39 per cent to 49 per cent. It is interesting to observe that those hospitals combining irradiation with radical surgery give the higher percentages of five-year "cures."

There is one distinct danger with irradiation, and that is the surgeon might relax in the thoroughness of the operative procedures, hoping that irradiation will take care of his neglect.

Finally, I do not believe that irradiation has shown a replacement value as compared to surgery, but it is of value as an adjunct to the most radical and careful surgery of which the operator is capable.

Jefferson Hospital.

Analyses, Selections, Etc.

The Physician and N. R. A.

On account of its great interest to all Americans at this time, we give herewith in full an editorial which appeared in the August 12th issue of the *Journal of the American Medical Association:*

Everywhere today men talk about the National Industrial Recovery Act. Questions have poured into the headquarters of the American Medical Association relative to the relationship of the medical profession to the N. R. A. and its stipulations. Probably the most significant of these questions concerns hours of work for physicians and hours of work and salaries to be paid to their assistants and attendants. At present it is safe to say that physicians are exempt, as are other professional men, from hours of work and payment stipulations under the N. R. A., and that their professional employees, such as laboratory technicians, radiologists, anesthetists and similar professional groups, are not immediately concerned. However, if a physician employs more than two persons as attendants in his office, of the class of clerical employees, accountants, laborers and similar types of help, they do come under the National Recovery Act with a minimum wage and certain maximum hours of work.

The medical profession, as far as concerns its private practice, need have no immediate concern over the stipulations of this act. The legislation is not intended to interfere with the personal relationship between physician and patient, necessary to the best type of medical care. Physicians have never had definite hours of work; they have always been subject to call at any moment for the benefit of their patients. The rights of the sick man are above hours of work or regulations of this character. It is hoped that every physician will enter wholly into the spirit of the National Recovery Act as an ideal, representing the government's point of view as to the principles and motives behind which the entire nation must unite if it is to pull itself out of the slough into which it has fallen.

In his relationship to the hospital, the physician will find himself in a somewhat more complicated situation. Because of the large number of employees involved, hospitals are definitely concerned under this act. A pre-

liminary interview of officers of the American Hospital Association with the Division of Re-Employment of the N. R. A. developed several interesting points of view. Apparently voluntary hospitals come under the provisions of the agreement with the possibility that they might be exempted when operated largely as charities incurring deficits in their operation, and also as institutions for the care of emergencies. It was the opinion of officials in Washington that administrative, professional nursing and student staffs, dietitians, technicians and other professional employees do not come under the provisions of the agreement, but that all maids, orderlies, waitresses, laundry workers and others in the lower level of wage earners do come within this classification. As hospitals give twenty-four hour service every day during the entire week, it was pointed out to General Hammond that it would work a hardship on the hospitals to attempt to apply a forty hour week for this type of personnel. Nevertheless, he expressed the opinion that seven days a week and eight hours a day constituted too many hours of employment and that even though the majority of such employees seldom put in a total of fifty-six hours, special consideration would have to be given to the question. This matter is being carried further by the American Hospital Association.

This act concerns the American Medical Association also as an employer in its headquarters office of some five hundred people. The headquarters office, by order of the Board of Trustees, entered promptly into the spirit of the act so far as concerns payment of employees in the lower wage levels and hours of work.

Again *The Journal* would urge physicians in all their relationships to enter fully into the spirit of the legislation, recognizing its experimental character but realizing that the times demand experimentation by the trial and error method if a solution is to be found for what has seemed in the past a most difficult problem.

Woman's Auxiliary, to the Medical Society of Va.

President—Mrs. William Lett Harris, 1112 Matoaka Street, Norfolk.
President-Elect—Mrs. Joseph Bear, 3012 Monument Avenue, Richmond.
Recording Secretary—Mrs. Fletcher J. Wright, 49 South Market Street, Petersburg.
Corresponding Secretary—Mrs. Charles A. Saunders, 1000 Gates Avenue, Norfolk.
Treasurer—Mrs. Reuben F. Simms, 2034 Park Avenue, Richmond.

National President's Address at Milwaukee Meeting.

The following excerpts are taken from the address of Mrs. James Blake, Hopkins, Minn., President of the Auxiliary to the American Medical Association:

"It is good for us to come together for these annual meetings and discuss our problems. Everyone of them is of interest and importance to the members of our Auxiliary."

"In our democratic plan of Medical and Auxiliary Organization, the County Medical Society is the basic unit. It is the only door through which admission may be secured to the State, and American Medical Association Auxiliary."

"When the County Society Auxiliary fails, the State and National groups fail. The State Auxiliary is strong, active and achieving, only when its component County Auxiliary units seriously assume and discharge their responsibilities."

"I am a firm believer in State's rights. I am going to stress the Educational program, the Public Relations program, the advance of *Hygeia* for each individual state, and a system of Press and Publicity work among members of neighboring State Auxiliaries."

"I believe every State and County president should make a systematic search for wasted effort in her county organization, should try to fill gaps—eliminate all overlapping in program of work."

"Our imperative need today is an undistorted sense of values, constructive thought, logical reasoning and sound judgment, combined with common sense and 'Team Work.' We as 'Doctors' Wives' know that to no one is life level all the way—there are depths to go through and heights to climb, and we need courage and inspiration. In offering you your National Chairwomen, I assure you they are ready with inspiration if you will supply the courage to forge ahead."

"If as Shakespeare has remarked, 'All the world's a stage and all the men and women merely players' thereon in a drama of mixed tragedy and comedy, let us resolve to 'Act well our part, for there all honor lies.' And as the

XUM

curtain rolls down on our very pleasant, happy and profitable Milwaukee meeting, let us each remember our own State, our own County—every State and every County, in this great country of ours, is our stage. You, all Auxiliary members, and I, are the players. The drama is waiting for us to take our parts. The curtain is slowly rolling and unfolding a new year. As your stage manager, you will always find me ready to prompt your work, shift the scenery, start the orchestra or any other thing I can possibly do to help make this year one continuous success for all of us."

Following are some suggestions offered by Mrs. Blake for Auxiliary work during 1933-34:

"I plan to make no radical changes in any Department of our work.

"I wish you at all times to remember that—

"The County or its equivalent, a District, Parish or a Council is the Unit for our work.

"Service to the men in our individual County Units, our keynote.

"The Advisory Board from the County Medical Society is our helpmate in every way.

"Sane planning of programs and expenditure of money the *duty* of every County President and her Executive Board, with the thought in the background of the County picture, that each County find and stress one thing if possible. Always remembering, that we aim *never* to tear *down*, but to back every worth while and authentic Health Project or Agency in a County, always remembering every group must *lead* or be *led*. So be the *leaders*, always under advice of your Advisory Council in every Community Project.

"Read your husband's State Medical Journal to keep in touch with the Problems of the Medical Profession. The picture is a wonderful panorama of changing scenery, and only by a monthly perusal of some authentic Medical Magazine, can you and I hope to keep our minds in condition to do a concrete, helpful piece of Auxiliary work."

"For the mutual benefit of every one on our membership list, let the Press and Publicity Department have your choice bits of work, your plans and your accomplishments."

"Everybody should make *Hygeia* a regular monthly diet. You just cannot exist in an Auxiliary way without it. And your influence in urging its use in any and every conceivable way by the lay public, will repay you and yours a hundred ways."

State Annual Meeting.

The annual meeting of the Auxiliary to the Medical Society of Virginia is to be held in Lynchburg, Ocotober 24th, 25th and 26th. An interesting program and attractive entertainments are being arranged for the ladies who attend this meeting. Mrs. George J. Tompkins, of Lynchburg, is chairman of the Ladies Committee. Preliminary program of this meeting will appear in the October issue of the MONTHLY.

Truth About Medicine

In addition to the articles previously enumerated, the following have been accepted by the Council on Pharmacy and Chemistry of the American Medical Association:

E. R. Squibb & Sons

Ipral Tablets, ¾ grain

The following product has been included in the List of Articles and Brands Accepted by the Council But Not Described in N. N. R. (New and Non-official Remedies, 1933, p. 437):

Merck & Co., Inc.

Carbon Tetrachloride—Merck.

Book Announcements

Pediatrics. By HENRY DWIGHT CHAPIN, M. A., M. D., Professor-Emeritus of Pediatrics, New York Post-Graduate Medical School, Columbia University; Founder and Medical Director of the Speedwell Soceity, etc. And LAWRENCE T. ROYSTER, M. D., Professor of Pediatrics and Head of the Department of Pediatrics, University of Virginia. Seventh Edition. Revised and rewritten by Lawrence T. Royster, M. D. Baltimore. William Wood and Company. 1933. Octavo of 775-xvi pages. Cloth. Price, $7.00.

"Lend a Hand"

Every once in a while we feel we should remind our readers that they owe a debt to our advertisers which may be paid by patronizing those who patronize us. Our State journal belongs to each member of the Medical Society of Virginia and each of us should feel it an obligation and a pleasure to keep it to the highest mark possible. Reproducing a paragraph which appeared in the *Kentucky Medical Journal recently:*

"We, are, therefore, urging all member physicians to read the advertising pages of the Journal and to give their patronage, wherever and whenever practicable, to the dealers and manufacturers who have so generously supported our publication. It is only through such patronage of our advertisers by members of the profession that we can hope to continue the Journal in its present size and be so able to take care of all the worthwhile material submitted for publication."

Virginia Medical Monthly

FOUNDED BY LANDON B. EDWARDS, M. D., APRIL, 1874
OWNED BY MEDICAL SOCIETY OF VIRGINIA SINCE NOVEMBER, 1919

PUBLICATION COMMITTEE

ALEXANDER G. BROWN, JR., M. D., Richmond, *Chairman and Editor*
J. H. NEFF, M. D., University R. L. PAYNE, M. D., Norfolk
AGNES V. EDWARDS, Richmond, *Business Manager*

All correspondence regarding editorial matters, articles, advertisements, subscription rates, etc., should be addressed to the Monthly, 1200 East Clay Street, Richmond, Va.

All advertisements are received subject to the approval of the Council on Pharmacy and Chemistry of the American Medical Association.

Subscription Price: $2.00 per annum in advance. Single Copies 25c.

VOLUME 60 SEPTEMBER, 1933 No. 6

Editorial

Anterior Pituitary Function.

Medical publications have been filled with accounts of investigations into the action and disease of the pituitary gland. Practitioners no doubt have experienced a sense of some confusion as the story of the new found functions has been unfolded. Numerous appraisements of them have been attempted in recent years. Even therapeutic and clinical applications of them have been made in medical, obstetrical, and surgical practice. Rather widespread has become the employment of some therapeutic principles of the gland. Besides, recognition of disease of the pituitary has become more frequent by reason of the fact that its disease manifestations have received wide notice in medical literature. In view of the situation above noted, it is appropriate that a consideration of the sum of our present knowledge of the anterior pituitary function, as recently discussed by Herbert M. Evans,* should be given the subject here. This article will serve as a reference in such comments.

It seems in order to refer briefly to the pituitary body as a whole. The structure is situated at the base of the brain. It lies in the sella turcica. In man it weighs not much over a half a gram. It is connected with the brain by a funnel-shaped stalk called the infundibulum. The gland is split by a cleft and is thus divided in two portions, namely, the anterior and the posterior. The anterior or pars glandularis consists of masses of epithelial cells. This is rich in blood vessels which arise from the circle of willis and enter through the infundibulum. The posterior part or pars nervosa is made up of neuroglia, cells and fibers and lying between these, there is some hyaline or granular material. It is believed that in this material the active principle is found. Physiologists of the present day write of the functions of this remarkable little body. Experiments and studies show that the gland is not essential to the continuance of life. This fact is astounding in a way because for a long time tradition seemed to give to this gland powers that experiments show it does not possess directly. Evans says that "seven pieces of research have now adequately furnished the criteria essential for establishing the fact that no portion of the hypophysis is essential for the continuance of life itself." Complete removal of the gland is possible without death, but such removal is signalized immediately by mal-effects in the general body and these bad effects grow graver and more marked with a continuance of life. Evans notes that such abnormal states vary in different animals and the length of life may be affected by monstrous changes.

*Reference: J. A. M. A., August 5, 1933, page 425.

THE GROWTH HORMONE

Growth changes are noted immediately upon the removal of the anterior lobe. Removal of this portion in the young animal continues the youth structures in the advancing age, such as possession of only milk dentition, fine hair,

open epiphyseal cartilages; a sort of perpetual youth; a youth that is a misfit in the adult, a dwarf, dwarfism resulting. What changes are produced by the parathyroid function in calcium metabolism is not as yet clearly determined. In such hypophysectomized animals, showing growth defects, as above described, immediate cessation of the mal-effects are noted upon adequate administration of the growth hormone. In dwarf rats and puppies, normal growth has been obtained by administration of the growth hormone. Even larger growth than normal has been gotten by the use of this growth hormone. Gigantism has been secured not only in the rat but in the dog. Evans states that in five months monstrous growth in purebred dachshunds has been produced; widening changes in the skull, overgrowth about the legs, head and neck; changes acromegalic in type have been produced.

The "Sex" Hormone

Evans' discussion of this subject brings before the reader recently found facts in this important field. Impressive changes occur in the genital system from the removal of the pituitary. In hypophysectomized young animals and in adults, marked changes are found; in youth there is failure of development; in the adult there is regression of the system in both sexes. Testes shrink, atrophic changes of testicle tubules show no sperm structure, and the prostate, seminal vesicles, and Cowper's glands are dwarfed. In the female animal, similar changes occur in the ovaries and other generative structures. In these cases both male and female manifest little or no sex interest or desire. Evans points out, however, that these functions and structural changes respond to the therapeutic employment of hypophyseal tissue or sex hormone. In connection with this discussion, the author describes the circumstances that lead up to the detection of the sex hormone. The work of Zondek and Aschheim is brought out: how that in the Spring of 1926 they happened to introduce bits of anterior hypophyseal tissue under the skin in the case of some rodents which had showed an immature genital system, with the striking effect of complete establishment of sexual maturity. This change showed itself in from three to five days. From this starting point, much data has been collected until now it is possible to extract the gonad-stimulating hormone from hypophyseal tissue. Evans also describes how the sex hormone may be gotten from the placenta, blood, and urine of the pregnant animal. This is extremely interesting and constitutes a new chapter in physiology and offers much in speculative thought in this field. It should be noted, also, that there is evidence of a direct relation of mammary secretion to hypophyseal influence. To this subject, Corner, under the title "The Hormone Control of Lactation," published in 1930, drew attention. Evans' paragraph on this topic affords interested readers a starting point for study of publications on this subject.

Respiratory Metabolism and the Thyrotropic Hormone

Under this title, Evans discourses upon interesting relations of metabolic rates and the disorders of the pituitary gland. Note is made of important observations disclosing strikingly low basal metabolic rates in cases of cachexia hypophysiopriva wherein there was found definite pituitary destruction or impairment. In the Fröhlich adiposity and other diseases of the pituitary, a low metabolic rate has been noted. The work of Foster and Smith, by hypophysectomy and replacement therapy in relation to basal metabolism and specific dynamic action in the rate showed lowering of the basal metabolic rate. When the posterior lobe alone and the anterior lobe alone were removed, no such decrease was observed, but on the removal of the whole gland, the metabolic rate was lowered. Other interesting effects are brought out. It is believed that there exists a thyrotropic hormone originating in synergistic actions of the anterior and posterior lobe of the pituitary.

Carbohydrate Metabolism and a Diabetogenic Hormone

It has been long known that a relation exists between the hypophysis and carbohydrate metabolism, but the relation of carbohydrate metabolism to the anterior lobe of the pituitary has been established through the work of Houssay and co-workers and others. Houssay's group has shown that diabetes brought about by the removal of the pancreas is ameliorated in a striking manner by hypophysectomy of the animal. Evans observes that the anterior lobe implants bring on hyperglycemia in such animals. Detection or discovery of the hormone, possessing this control of the pancreas-pituitary relation in carbohydrate metab-

olism, has not been definitely made. Evans states that "the gonado-tropic hormone is clearly not involved" and further that diabetogenic hormone has not been separated from the growth and thyroid or epinephrine-effecting hormones.

AN ADRENALOTROPHIC HORMONE

One of the most interesting changes, notes Evans, is the effect, gotten by the removal of the pituitary gland, upon the adrenals. In such dwarf-animals the body weight is below normal and the suprarenals are atrophic and diminutive. As the suprarenal cortex is essential to life, it was noted that the strange sickness and death of such hypophysectomized animals is stopped immediately by the administration of aqueous alkaline extracts of the anterior lobe. Sudden resuscitation is further characterized by general body growth and regrowth of adrenal cortex. Hence, it appears that the adrenal cortex requires some constituent of the anterior lobe of the pituitary gland. In this new found interdependence it is hoped there is to emerge the discovery of an adrenalotrophic hormone as distinguished from some properties of the growth hormone, the thyrotropic hormone and the lactogenic hormone. It seems to be affiliated with some one of the elements of the growth hormone but not with all. It is hoped that Addison's disease may be attacked by the replacement of this special pituitary hormone from anterior lobe.

Practitioners who peruse this thought stimulating account of the work in this field may be filled with wonderment. One can no longer fail to recognize the possibilities of this vast field over which this minute gland apparently presides—in the growth of the body, in the emotions or effects of sex life, in the lactation of the mother, in the action of the thyroid upon the heat and metabolism of the body, in the influence upon the metabolism of the "staff of life," carbohydrates, in the effect of the functions of the adrenals so necessary to life of the animal. One has the astounding fact to face that in the pituitary gland—in the anterior lobe—medical problems of vast proportion reside.

Lynchburg Meeting of the Medical Society of Virginia.

The next annual meeting of the Medical Society of Virginia takes place in Lynchburg, October 24-26.

This meeting promises to offer much of interest to those who attend. The usual program of scientific papers will be presented. The program committee is giving attention to this matter and it is hoped that interesting material may be presented for consideration. It is urged that members make every effort to attend this meeting. The location makes for general accessibility to members. The hospitable city of Lynchburg will do everything possible to make the visiting profession comfortable. This meeting will doubtless have before it important practical matters that must receive the well considered judgment of the profession. For this reason, also, attendance is urged upon all.

The Physician and the National Recovery Act.

Our readers are urged to read an editorial published August 12, 1933, in the *Journal of the American Medical Association*. This may be found, reproduced in full, in this issue of the MONTHLY on page 384.

Cooperation in this great effort is necessary if it is to succeed. Understanding of the plan is needed. Each industry and profession must comprehend its obligation in order to do its part. This carefully prepared statement by the Editor of the *Journal of the American Medical Association* contains the relationship and the obligations that the members of the medical association have in this national movement. A perusal of it will be helpful in arousing a lively and enthusiastic interest in this unprecedented mass movement for national economic recovery.

Department of Clinical Education
OF THE MEDICAL SOCIETY OF VIRGINIA

A Children's Clinic.

In accordance with its policy of encouraging pediatric clinics for the practitioners of the state, the Department of Clinical Education secured two speakers from the University of Virginia for the meeting of the Medical Society of Northern Virginia on August 15th.

Among the guest speakers on the program

was Dr. C. E. Conrad, of Harrisonburg, who talked on "The Physician's Relation to the Health Program for Pre-School Children." Dr. L. T. Royster's subject was "Diarrhoea," followed by an exhibit of clinical cases, and Dr. R. V. Funsten spoke on "Congenital Deformities and the Orthopedic Treatment of Infantile Paralysis," also followed by an exhibit of cases.

This is the first of an anticipated series of local society meetings featuring pediatrics, a subject in which many physicians expressed interest at the completion of classes in prenatal and postnatal care conducted by the Joint Committee. The fostering of pediatric programs is in accordance with the motion adopted at a meeting of the Department of Clinical Education that "The Department goes on record as favoring the provision of a definite pediatric program to be conducted under the auspices of the local medical societies and recommends that one all-day pediatric clinic be held each year by such societies, if possible."

The Department of Clinical Education and the Pediatric Society of Virginia are glad to cooperate in any possible way to help secure speakers on pediatric subjects for local society meetings.

GEO. W. EUTSLER,
Executive Secretary.

Progress of Sixth Circuit of Classes in Prenatal and Postnatal Care.

With the completion of four meetings of the course in prenatal and postnatal care in Lebanon, Tazewell, Bristol, Marion and Abingdon, the success of the circuit seems assured. The total enrollment for the five classes originally scheduled is 53, and the average attendance each week 58.5. Despite the mid-summer heat and storms, the attendance at classes in this sixth circuit has been above the average, with a per cent of 82.2 for the enrolled members. Dr. Lapham, the Field Clinician, has had many calls for his out-of-class consultation services, and the interest and cooperation of the physicians taking the course has been most encouraging.

One meeting of the Tazewell group was held in Bluefield, West Virginia, at the invitation of Dr. H. G. Steele, so that the members of the class might have the benefit of demonstration upon the patients in the prenatal clinic there.

Below is a table showing figures for the first four meetings of the classes now being conducted in Southwest Virginia.

	Enrolled		*Visitors*		*Attendance*	
	No.	*Present*	*No.*	*Present*	*Average*	*Per cent*
Tazewell	9	30	7	9	9.7	83.3
Lebanon	8*	20	3	6	6.5	71.4
Bristol	15*	45	16	32	19.2	80.3
Abingdon	11*	35	6	11	11.5	87.5
Marion	10	35	5	11	11 5	87.5
	53	165	37	69	58.5	82.0

*Excluding from percentages one enrolled member who has never attended.

RICHLANDS CLASS

In addition to the enrollment of fifty-three in the five classes listed above, a sixth class was added to the circuit through the influence of Dr. J. P. Williams for the convenience of physicians in Richlands and vicinity. Dr. Lapham was glad to take on the extra class, which meets on Tuesdays at 7:30 P. M., in the hospital at Richlands. The physicians attending the four meetings which have been held are: Drs. Rufus Brittain, I. W. Cunningham, A. D. Parson, W. A. Seawell, J. W. Shawver, J. P. Williams and W. R. Williams. Despite the handicap of delay in organization, the average attendance has been 6.25 for four meetings and the per cent of attendance 89.2—a percentage higher than for any other class in the circuit and well above the average of all the circuits which have been conducted. This response and interest is very gratifying to the Joint Committee and to those interested in its undertaking.

Plans for Circuit in Danville and Vicinity.

Upon the completion of the sixth circuit in the middle of September, it is expected that Dr. Lapham will conduct a circuit of classes in Danville and vicinity, with centers tentatively planned for Danville, Chatham, Martinsville and convenient points in Mecklenburg and Halifax counties. Dr. P. W. Miles and Dr. I. C. Harrison have written of the interest of the Danville physicians in the course and predicted that twenty or more physicians would enroll for the course there. Dr. J. M. Shackelford, of Martinsville, has confirmed the interest of his colleagues there and predicted that a class of at least ten will enroll. An agent of the Joint Committee expects to attend meetings of local societies in the first week of September to explain the proposed classes and secure the approval of the socie-

ties for going forward with the work of organization in the territory. At such a favorable season of the year and with the successful experience of a year and a half behind it, it is anticipated that the Danville area will furnish a circuit of classes as favorable to postgraduate study as any that have been conducted.

GEO. W. EUTSLER,
Secretary of Joint Committee.

Proceedings of Societies

Virginia State Board of Medical Examiners.

The number of new doctors licensed by the State Board of Medical Examiners in June was said to be the largest within the past twenty years. Of those listed below, sixteen were received through reciprocity:

Dr. Charles J. Albright, Norfolk, Va.
Dr. C. V. Amole, University, Va.
Dr. E. H. Anderson, Richmond, Va.
Dr. Clarence E. Arnette, Richmond, Va.
Dr. W. H. Aufrane, Columbia, Mo.
Dr. L. P. Bailey, Scottsburg, Va.
Dr. James P. Baker, Jr., Boston, Mass.
Dr. E. E. Barksdale, University, Va.
Dr. S. J. Beeken, Richmond, Va.
Dr. John G. Bell, Richmond, Va.
Dr. Wm M. Bickers, Boston, Mass.
Dr. Wm. R. Bishop, Galax, Va.
Dr. Francis Isabelino Bloise, Lorton, Va.
Dr. N. Lewis Bosworth, Jr., University, Va.
Dr. Francis K. Bradford, Richmond, Va.
Dr. Felix J. Brown, Washington, D. C.
Dr. R. H. Bruner, Washington, D. C.
Dr. Robert Buckley, Richmond, Va.
Dr. H. R. Butt, Bethlehem, Pa.
Dr. E. P. Buxton, Jr., Richmond, Va
Dr. Paul Douglas Camp, Jr., Richmond, Va.
Dr. Joseph W. Carney, Huntington, W. Va.
Dr. W. B. Carpenter, Richmond, Va.
Dr. Pietro Caruso, Richmond, Va.
Dr. Wm Hardee Chapman, Montvale, Va.
Dr. Edgar Childrey, Jr., Dumbarton, Va.
Dr. Homer F. Clarke, Massies Mill, Va.
Dr. Alfred J. Coan, Baltimore, Md.
Dr. Gilbert C. Cockburn, Washington, D. C.
Dr. Andrew Thomas Cole, Chilhowie, Va.
Dr. E. O. Coleman, Richmond, Va.
Dr. Wm. D. Comess, Altoona, Pa.
Dr. Charles H. Conley, Frederick, Md.
Dr. C. W. Copenhaver, Bristol, Tenn.
Dr. F. J. Crigler, Richmond, Va.
Dr. Wm. Gayle Crutchfield, Richmond, Va.
Dr. Paul Q. Daniel, Deltaville, Va.
Dr. Howard L. Dean, Petersburg, Va.
Dr. John E. Dees, State Sanatorium, Md
Dr. Edward A. Delarue, Jr., Sanatorium, Va.
Dr. Robert H. Detwiler, Clarendon, Va.
Dr. William Sterling Dosher, Richmond, Va.
Dr. Samuel F. Driver, Troutville, Va.
Dr. James S. Dryden, Norfolk, Va.
Dr. J. N. Dudley, Richmond, Va.
Dr. Willis F. Evans, Richmond, Va.
Dr. Gerard V. Farinola, Brooklyn, N. Y.
Dr. A. T. Finch, Jr., Chase City, Va.
Dr. Daniel Sebastian Fisher, Parksley, Va.
Dr. G. S. Fitz-Hugh, University, Va.
Dr. Hamilton D. Fitzpatrick, Richmond, Va.
Dr. H. F Flippin, University, Va.
Dr. M. D. Foster, Richmond, Va.
Dr. Alton Brooks Freeman, Richmond, Va.
Dr. Harry M. Frieden, Norfolk, Va
Dr. M. T. Garrett, Washington, D. C.
Dr. C. E. Glenn, Dumbarton, Va.
Dr. M. M. Gordon, Washington, D. C.
Dr. J. T Green, Jr., Madison, Wis.
Dr. B. C. Grigsby, Richmond, Va.
Dr. Wm. Grossman, University, Va.
Dr. H H. Hammer, Winston-Salem, N. C.
Dr. Herbert Rudolph Hartwell. Roanoke, Va.
Dr. Fred Hauser, Richmond, Va.
Dr. Josiah E. Haynesworth, Jr., Buckingham, Va.
Dr. W. E. Herrell, Seattle, Wash.
Dr. Upshur Higginbotham, Bluefield, W. Va.
Dr. R. N. Hillsman, University, Va
Dr. J. M. Hitch, Jr., University, Va.
Dr. Paul Hogg, Wicomico, Va.
Dr J. B. Hopkins, Richmond, Va.
Dr. John B. Hozier, Seattle, Wash.
Dr. J. M. Hurt, Blackstone, Va.
Dr. F. M. Jacobs, Roanoke, Va.
Dr. J. M. Jackson, Harrisonburg, Va.
Dr. C. C. Johnson, Baltimore, Md.
Dr. J. B. Johnson, Jr., Richmond, Va.
Dr. Mary E Johnston, Richmond, Va.
Dr. J. Bernard Jones. Norfolk, Va.
Dr. L. P. Jones, Richmond, Va.
Dr. R. A G. Jones, Richmond, Va.
Dr. R. H. Jones, Chattanooga, Tenn.
Dr. Robert H. Jordan, Huntington, W. Va.
Dr. Samuel H. Justa, Richmond, Va.
Dr. W. L. Kelly, Cincinnati, Ohio.
Dr. Edward L. Kinney, Charlottesville, Va.
Dr. J. L. Kinzie, Richmond, Va
Dr. J. B. Kiser, Richmond, Va.
Dr. Henry M. Ladrey, Washington, D. C.
Dr. A. F. Lapsley. Louisville, Ky.
Dr. Norman L. Lee, Washington, D. C.
Dr. Gershan J. Levin, Norfolk, Va.
Dr. R. G. Magruder, New York, N. Y
Dr. C. H. Mauzy, Jr., Harrisonburg, Va.
Dr. Ernest F McClellan, Huntington, W. Va.
Dr. Moses H. McClintic, New York, N. Y.
Dr. Eleanor H. McCoy, Cambridge, Mass.
Dr. H. C McCoy, University, Va.
Dr. E. P. McKinney, Cincinnati, Ohio.
Dr. Samuel Mirmelstein, Akron, Ohio.
Dr. O. F Mitchell, Headwaters, Va.
Dr. B. W. Mongle, Holston, Va.
Dr. A. R. Payne, University, Va.
Dr P. C. Pearson. Richmond, Va.
Dr. E. W. Perkins. III. Petersburg, Va.
Dr. F. R. Person, University, Va.
Dr. B. K Peter, University, Va.
Dr. C. Burchell Phillips, Washington, D. C.
Dr. J. F. Phillips, Newport News, Va.
Dr. J. W. Phillips, Jr., Richmond, Va.
Dr. J. B. Porterfield, Charlottesville, Va.

Dr. C. W. Purcell, Louisa, Va.
Dr. W. A. Read, Newport News, Va.
Dr. Patter A. Richards, Richmond, Va.
Dr. C. B. Robertson, Petersburg, Va.
Dr. J. A. Ronan, Alexandria, Va.
Dr. George F. Salle, Hallsboro, Va.
Dr. Wm. Schnauffer, Jr., Richmond, Va.
Dr. James Scott, University, Va.
Dr. Mildred E. Scott, Fredericksburg, Va.
Dr. E. W. Senter, Bristol, Tenn.
Dr. Andrew Shapiro, Petersburg, Va.
Dr. Nathan Sharove, Richmond, Va.
Dr. Merriwell Tieche Shelton, Chatham, Va.
Dr. H. B. Showalter, Kenbridge, Va.
Dr. I T. Shure, Brooklyn, N. Y.
Dr. Victor H. Simiele, Norfolk, Va.
Dr. John A. Sims, Charlottesville, Va.
Dr. R. B. Smiley, Salem, Va
Dr. Joel H. Smith, Athens, W. Va.
Dr. J. S. Staley, Marion, W. Va
Dr. Jacob Edmund Stanfill, Pennington Gap, Va.
Dr. Alfred Steiner, Richmond, Va.
Dr. Edward Stratton, Jr., Jersey City, N. J.
Dr. H. A. Stratton, Washington, D. C.
Dr. J. T. B Strode, Amherst, Va.
Dr. Caldwell Jackson Stuart, Dahlgren, Va.
Dr. J. A. M. Thompson, University, Va.
Dr. G. N. Thrift, Madison, Va.
Dr. Thomas Haze Tomlinson, Jr., Ambury, Va.
Dr. J. W. Trenis, Callett, Va.
Dr. R. I. Trent, University, Va.
Dr. Albert Trimpert, Alexandria, Va.
Dr. A. K. Turner, Boston, Mass.
Dr. V A. Turner, University, Va.
Dr. E. T. Upson, Baltimore, Md.
Dr. E. D. Vaughan, Ashland, Va.
Dr. J. E. Vaughan, Charleston, W. Va.
Dr. George E. Waters, Baltimore, Md.
Dr. J. O. Watkins, Jr., Richmond, Va.
Dr. Herman Weinberg, New Orleans, La.
Dr. James E. White, Norfolk, Va.
Dr. Hugh L. C. Wilkerson, Petersburg, Va.
Dr. P. L Wolgin, Elizabeth, N. J.
Dr. W. H. Wood, Jr., Charlottesville, Va.

The Augusta County Medical Association, Inc.,

Held its annual meeting August 2nd at Staunton, Va., with the president, Dr. Glenn C. Campbell, presiding. There was a large attendance and several new members were elected. Case reports were presented by Drs. A. F. Robertson, M. J. Payne, Kenneth Bradford and A. L. Tynes.

The following officers were elected: President, Dr. H. T. Hawkins, Waynesboro; vice-presidents, Drs. T. R. Rolston, New Hope; C. W. Rodgers, and J. B. Catlett, both of Staunton; secretary, Dr. W. F. Hartman, Swoope (re-elected); and treasurer, Dr. T. M. Parkins, Staunton (re-elected). Delegates to the State Society meeting were also appointed at this time.

The Loudoun County Medical Society,

At its meeting held at the home of Dr. W. O. Bailey, on July 19th, re-elected Dr. H. P. Gibson and Dr. W. O. Bailey, both of Leesburg, as president and secretary-treasurer, respectively.

News Notes

All Members Should Accept This Invitation.

In addition to the invitation extended by the Lynchburg Academy of Medicine, Inc., to hold our sixty-fourth annual meeting in their city this Fall, the following cordial welcome has been extended our Society by the Mayor, in behalf of the city:

The City of Lynchburg extends a most cordial invitation to the members of the Medical Society of Virginia to attend the State meeting of the Society, to be held in Lynchburg, on October 24, 25 and 26. Lynchburg is most centrally located, and has excellent hotel facilities. We hope that a large number of members can be present at this meeting.

Yours very truly,

JOHN VICTOR,
Mayor.

HIGH LIGHTS ABOUT THE MEETING

Golfing and other privileges of the Oakwood and Boonsboro Country Clubs will be extended to the members and guests of the State Society attending the meeting in October. A golf tournament will be held on the 24th, at the Boonsboro Country Club and all members desiring to enter are requested to send in their entries to Dr. F. O. Plunkett, Allied Arts Bldg., Lynchburg, Va.

Dr. Don Preston Peters is in charge of the Scientific Exhibits and all planning such exhibits should communicate with him or write Dr. C. B. Morton, State Society Chairman, University, Va. The convention headquarters in the Virginian Hotel provide abundant and convenient space for all exhibits, with the commercial exhibits in the main lobby, and the scientific exhibits in a commodious anteroom to the main meeting hall.

Dr. James R. Gorman heads the committee on Hotels and meeting places, and requests that members and guests wishing reservations notify him of their expected time of arrival, duration of stay, and accommodations desired. The Virginian Hotel offers single rooms without bath

for $1.75, single rooms with bath $2 50 to $3.50 and double rooms with bath $4.00 to $6.00. The Carroll Hotel, one block away, offers single rooms without bath $1.50 to $1.75, with bath $2.00 to $2.50, double rooms without bath $2.50 to $3.00, with bath $3.00 to $3.50. In addition there are several smaller hotels within one or two blocks with accommodations from $1.00 up.

Mrs. Geo. J. Tompkins, and committee, are preparing plans for the entertainment of the visiting ladies. These plans will center largely around functions to be held at the Country and Woman's Clubs.

The Southwestern Virginia Medical Society

Is to hold its semi-annual meeting in Wytheville, September 15th, under the presidency of Dr. J. A. Noblin, of East Radford. The secretary, Dr. H. W. Bachman, Bristol, advises that the following titles had been received from members at time we go to press: Endometriomata, by Dr. A. P. Jones, Roanoke; Bronchoscopy, Its Value to the General Practitioner, by Dr. E. G. Gill, Roanoke; Fever Therapy in Paresis, Dr. James King, Radford; Caesarean Sections, by Dr. A. M. Showalter, Christiansburg. Dr. J. B. McElroy, Memphis, Tenn., will be one of the guest speakers and will take as his subject some phase of Bright's disease.

Married.

Dr. Fred Taylor Renick, Crozet, Va., and Miss Frances Hughes, Harrisonburg, Va., July 10th. Dr. Renick graduated from the Medical College of Virginia in 1931, following which he interned at Gallinger Hospital, Washington, D. C.

Dr. Randolph Bryan Grinnan and Miss Adelaide Richardson Buist, Brooklyn, N. Y., August 5th. Dr. Grinnan was formerly of Norfolk, Va., and graduated from the University of Virginia, Department of Medicine, in 1932, since which time he has been interning at the Boston (Mass.) City Hospital.

Dr. Robert Buckley, of the 1933 class, Medical College of Virginia, and Miss Maxine Elizabeth Frix, both of Richmond, Va., August 8th.

Dr. Howe Reese Coleman, Jr., Lexington, Va., of the class of '29, University of Virginia, Department of Medicine, and Miss Virginia Hightower, Montgomery, Ala., August 22nd.

The Southside Virginia Medical Association

Will hold its next quarterly meeting in Emporia, Va., September 12th. An interesting program is being arranged for this occasion. Dr. D. C. Mayes, Church Road, is president, and Dr. R. L. Raiford, Franklin, secretary.

Richmond Meeting of S. M. A.

It has been such a number of years since the Southern Medical Association met in Richmond, that doctors in this section are looking forward with special interest to this occasion on November 14th to 17th, inclusive. An excellent program is being arranged and will include the usual exhibits and clinics. The post-meeting day in Washington also offers much of interest.

Inquiries as to details, according to their nature, should be addressed to Mr. C. P. Loranz, secretary-manager, Empire Building, Birmingham, Ala., or to Dr. Fred M. Hodges, 1000 West Franklin Street, Richmond, Va., general chairman of the local committee of arrangements.

News Notes From Medical College of Virginia.

Promotions in the major faculty for the session 1933-34 are as follows:

In the school of medicine, Dr. Wyndham B. Blanton from associate professor of the history of medicine to professor of the history of medicine.

Dr. W. R. Bond from associate professor of physiology to professor of physiology.

Dr. H. B. Haag from associate professor of pharmacology to professor of pharmacology.

Dr. R. H. Courtney from assistant professor of ophthalmology to associate professor of ophthalmology.

Dr. D. D. Talley from associate professor of roentgenology to professor of roentgenology, succeeding the late Dr. Alfred L. Gray.

In the school of dentistry, Dr. Harry Lyons from professor of periodontia and associate professor of oral pathology and therapeutics to professor of periodontia and oral pathology.

Dr. R. L. Simpson from professor of crown and bridge prosthesis to professor of clinical practice.

Dr. P. L. Chevalier from associate professor of crown and bridge prosthesis to professor of crown and bridge prosthesis.

Dr. S. F. Bradel from associate in crown and bridge prosthesis to assistant professor of crown and bridge prosthesis.

Dr. J. G. Jantz from associate in anatomy to assistant professor of anatomy.

In the school of nursing, Miss Lulu K. Wolf from associate in nursing to assistant professor of nursing.

Dr. Charles W. Morhart, of Cleveland, Ohio, has been appointed instructor in prosthetic dentistry for the session 1933-34, succeeding Dr. V. R. Trapozzano, resigned.

Recent alumni visitors to the college were: Dr. J. B. H. Bonner '32, Dr. Clarence Porter Jones '95 and Dr. J. D. Sharp '31.

Dr. J. L. McElroy, superintendent of the hospital division since 1929, has resigned to become director of the American Hospital, Paris, France. He has already left to take up his new duties. Dr. McElroy was an able and experienced hospital executive and made an important contribution to the upbuilding of the college hospitals.

Dr. Lewis E. Jarrett, senior assistant superintendent of the hospital division, has been promoted to the superintendency, succeeding Dr. J. L. McElroy, resigned. Dr. Jarrett is a native of Lexington, Va., a graduate both in the school of pharmacy and of medicine, Medical College of Virginia. He has been a member of the hospital administrative staff of the college hospitals for about ten years. As a medical student he won high honors and was president of the student body his senior year.

News from Duke University School of Medicine and Duke Hospital.

The following appointment, effective October 1, 1933, has been made: Dr. Frederic M. Hanes, of Winston-Salem, N. C., Professor of Medicine in the School of Medicine and head of the department of medicine in the Hospital. Dr. Hanes was graduated with the A. B. degree from the University of North Carolina in 1903; received the A. M. degree from Harvard University in 1904, and the degree of M. D. from The Johns Hopkins University School of Medicine in 1908. He was Associate Professor of Pathology at Columbia University for three years, and Associate Professor of Medicine at Washington University for a year. He has been connected with the Presbyterian Hospital in New York, the Rockefeller Institute, and Queen's Square Hospital, London.

In addition to the above, twelve new appointments have been made to the resident staff of the hospital.

The following seniors have been elected to membership in the Honorary Fraternity of Alpha Omega Alpha: Robert L. McMillan, Paul G. Reque and Jarrett E. Williams.

Dr. Booker Lee,

Formerly of Roanoke, Va., is now located at Pulaski, Va., where he is engaged in the practice of his specialty, diseases of the eye, ear, nose and throat.

Dr. William C. Schroeder

Has opened offices in Medical Arts Building, Norfolk, Va., where his practice will be limited to tuberculosis. He graduated from the University of Virginia, Department of Medicine, in 1899.

After several years of general practice in Portsmouth, Va., Dr. Schroeder entered the U. S. Public Health Service where his work had to do largely with tuberculosis. He later served as superintendent of the New York City Municipal Sanatorium at Otisville, N. Y.

Dr. John B. H. Bonner,

Class of '32, Medical College of Virginia, who served his internship last year at the State Hospital, Hazleton, Pa., has located at Maidens, Va., for general practice. He will also serve as resident physician for the Industrial School for Boys at that place.

A Medico-Military Course for Medical Reserve Officers.

The medico-military course of inactive duty training for Medical Department Reserve officers, which has been held at the Mayo Clinic during the past four years, will again be held this year from October 1st to 14th, both dates, inclusive. This inactive duty training will follow the plan so well worked out under the auspices of Colonel George A. Skinner and the military features will be under his personal supervision.

The course offers valuable and interesting training for the Medical Department officers of all the components of our national defense. The staff and faculty of the Mayo Clinic have again placed their unexcelled facilities at the service of their government in the interest of preparedness, and have extended an invitation to all the services to participate.

This short course is equally applicable to

general practitioners and specialists. The morning hours are devoted to purely professional subjects selected by the student officers. The afternoon hours pertain solely to medico-military subjects and the evening hours are covered in a lyceum course of general interst.

Application for this course of inactive duty training should be made to the Corps Area Surgeon, Seventh Corps Area, Omaha, Neb. Applications should state the character of the work the candidate desires to follow in the morning hours. All student officers are expected to attend and participate in the afternoon and evening sessions. Each applicant should fully understand that the invitation to accept this course of study without charge is extended by the Mayo Clinic; that the project is without expense to the Government; and that one hundred hours' credit will be given those who take and complete the course. While it is desirable to attend the entire course, those whose time will not permit this may join or leave at any time and will receive credit for the hours spent in training. Uniforms are optional.

Dr. E. G. Gill,

Roanoke, Va., was elected to the Board of Directors of the Lions' International, at its recent convention in St. Louis.

The American Public Health Association

Will hold its sixty-second annual meeting in Indianapolis, October 9-13, 1933.

Details with regard to the scientific program may be obtained from the American Public Health Association, 450 Seventh Avenue, New York, N. Y.

Capt. Claude L. Neale, M. C., U. S. A.,

Who was recently transferred from Fort Monroe, Va., to Tripler General Hospital, Honolulu, T. H., is at present chief of the obstetric and pediatric sections at the Hospital. Dr. Neale is a member of the class of '28, Medical College of Virginia.

Dr. Charles Neill Scott,

Class of '32, Medical College of Virginia, who interned at Stuart Circle Hospital, Richmond, the past year, has located in this city for general practice and has offices at 2219 Park Avenue.

Dr. Meyer Vitsky

Has located at 1103 West Franklin Street, Richmond, Va., for general practice, emphasizing obstetrics. He is a graduate of the Medical College of Virginia in the class of '30, and last year was resident physician at the Retreat for the Sick Hospital, Richmond.

Interstate Post-Graduate Medical Association of North America.

The International Assembly of the Interstate Post-Graduate Medical Association of North America will be held in the Public Auditorium, Cleveland, Ohio, October 16-20, 1933. This year's president is Dr. William J. Mayo, of Rochester, Minn. Many distinguished teachers and clinicians will appear on the program. A major list of the names of the contributors to the program, with other information, appears on advertising page 2, of this issue of the MONTHLY. All members of the Medical Society of Virginia are invited to attend. The registration fee of $5.00 admits all members of the profession in good standing. Reduced railroad rates may be secured from all parts of the United States and Canada.

Detailed information and programs may be had from the Managing Director, Dr. William B. Peck, Freeport, Ill.

Dr. L. I. Hoke,

Recently of Quinwood, W. Va., has moved to Layland, W. Va. Dr. Hoke is an alumnus of the Medical College of Virginia, class of '29.

Dr. James G. Lyerly,

Recently of Richmond, Va., where he was assistant professor of neurological surgery in the Medical College of Virginia, has located in Jacksonville, Fla., with offices in St. James Building. He will continue the practice of his specialty in that city.

Dr. W. Gayle Crutchfield,

Of Lexington, Ky., has recently become associated with Dr. C. C. Coleman, in Richmond, Va., in the practice of neurological surgery. Dr. Crutchfield is a graduate of Johns Hopkins University. He took his hospital service in the Wilmer Institute and Women's Hospital in Baltimore, the Peter Bent Brigham Hospital in Boston, and further post-graduate work in the surgical clinics of Vienna. Dr. Crutchfield succeeds Dr. J. G. Lyerly who has recently moved to Jacksonville, Fla.

Dr. George Tully Vaughan,

Washington, D. C., recently resigned as professor of surgery at Georgetown University School of Medicine, after a service of over

thirty-five years, and was made professor emeritus.

Dr. James A. Cahill, Jr., professor of clinical surgery, will succeed Dr. Vaughan.

The American Congress of Radiology,

Which will include meetings of the American College of Radiology, the American Radium Society, the American Roentgen Ray Society, and the Radiological Society of North America, will meet in Chicago, September 25th to 30th. Dr. Henry K. Pancoast, of Philadelphia, is president of the Congress. Further information may be obtained from Dr. Benjamin H. Orndoff, 2561 North Clark Street, Chicago, Ill.

Dr. Charles O. Moody,

Of the class of '31, Medical College of Virginia, recently located in Hampton, Va., for the general practice of medicine. Dr. Moody spent the past year in Morgantown, W. Va., where he was connected with the Medical Faculty of the West Virginia University as an instructor.

The Graduate Fortnight of New York Academy of Medicine

Is to be held in New York, October 23 to November 3, 1933, the subject this year being "Disorders of Metabolism." There will be hospital clinics in fifteen of New York's leading hospitals, evening sessions with prominent speakers, and a scientific exhibit bearing upon the various aspects of the general subject.

Those interested may obtain detailed information and a program from the New York Academy of Medicine, 2 East 103rd Street, New York City.

Dr. Frank W. Hewlett,

Richmond, member of the class of '31, Medical College of Virginia, has just been appointed a first lieutenant in the Medical Corps Reserve.

Dr. C. L. Fifer,

Recently of University, Va., has located in Alexandria, Va., with offices at 904 Prince Street. He will limit his practice to surgery and gynecology. He is a graduate of the University of Virginia, in the class of '28, since which time he has interned and taken post-graduate work in his specialty at the University.

Dr. W. Harman Evans,

For some time of Lynchburg, Va., announces his change of address to Concord Depot, Va.

Dr. Richard B. Nicholls,

Who has been engaged in the practice of obstetrics and gynecology in Norfolk, Va., since October, 1932, has moved his offices to 808 Wainwright Building, that city, where he will continue the practice of his specialty.

A Microscopic, Oral Cavity, and Bone Diagnostic Demonstration

With lantern slides, is to be held at the Mayflower Hotel, Washington, D. C., September 17 to the 24, 1933, inclusive. The change from Baltimore, the usual place for holding these demonstrations, to Washington is because of the artificially cooled demonstration rooms, etc. A case to be shown must be put in lantern slides. Dr. Joseph Colt Bloodgood, of Baltimore, is sponsoring this demonstration. For further information, write Dr. Charles F. Geschickter, Johns Hopkins Hospital, Baltimore, Md.

Obituary Record

Dr. William Samuel Briggs,

Prominent physician of Dinwiddie County, Va., died August 8th, as a result of injuries received in a fall. He was 76 years of age and a graduate of the Kentucky School of Medicine in 1890. Dr. Briggs had practiced in Dinwiddie County since his graduation. He had been a member of the Medical Society of Virginia for thirty years. Two sons and a daughter survive him.

Dr. T. G. Brown,

Gainesville, Va., died August 3rd, following a long illness. He was 76 years of age and a graduate of the University of Maryland. Dr. Brown had practiced medicine in Fauquier and Prince William Counties for fifty years. He was a member of the Medical Society of Virginia. His wife and two sons survive him.

Dr. Ernest Helm Muse

Died in Roanoke, Va., June 10, 1933, age 52. Dr. Muse graduated from the University College of Medicine, Richmond, class of 1907. Following his graduation, he took post-graduate work at the New York Polyclinic. He was active in fraternal organizations, being a member of the Shrine, D.O K.K. and Elks and had been a member of the Medical Society of Virginia for twenty-six years. Dr. Muse never married but is survived by his brother, William R. Muse, D.D.S., of Roanoke.